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SMITHSONIAN MISCELLANEOUS COLLECTIONS.

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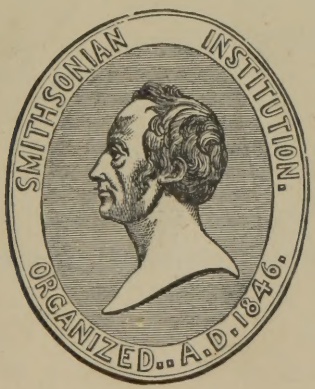
# CONSTANTS OF NATURE.

## PART I.

SPECIFIC GRAVITIES; BOILING AND MELTING POINTS; AND CHEMICAL FORMULA.

COMPILED BY

FRANK WIGGLESWORTH CLARKE, S.B.






WASHINGTON, D.C.
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DECEMBER, 1873.

# ADVERTISEMENT.

THE Smithsonian Institution has long had in contemplation the publication of a series of "Constants of Nature," and has accepted the following work as the first part of such a series. Other parts will be published in succession as soon as the matter for them may be obtained and the finances of the Institution will warrant.

The present work was referred for critical examination to Professors Joy and Chandler of Columbia College, New York, and has been published on their recommendation.

JOSEPH HENRY,

*Secretary S. I.*

WASHINGTON, D. C., December, 1873.



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# TABLE OF CONTENTS.

# INTRODUCTION.

About two years ago, while engaged upon the study of some interesting points in theoretical chemistry, the compiler of the following tables had occasion to make frequent reference to the then existing lists of specific gravities. None of these, however, were complete enough for his purposes. Böttger's work was too old, and not suitably arranged; and the tables published in the various larger treatises on chemistry were lamentably small. Accordingly he prepared a set of Specific Gravity Tables for his own private use, without view toward publication. The material proved abundant; revisions and re-revisions became necessary, and, finally, it seemed to the writer advisable to complete and publish the tables. And in the final revision the boiling and melting points, and the references to original papers were added.

Of course, having grown out of the individual needs of the compiler, the character of the tables has been shaped by the nature of the work upon which he was at first engaged. It was necessary for him to compare the specific gravities of similar compounds of the same elements, and to arrange them in series. In consequence it will be found, on reference to those portions of the tables containing organic compounds, that no rigid theoretical arrangement could well be followed. It would be very well, doubtless, to be able to compare at a glance the properties of ethyl and all its compounds, or of benzol and all its derivatives. But such an arrangement would necessitate the comparison of hydro-carbons with oxygenated, chlorinated, nitrogenous, or organo-metallic bodies; or, in other words, the comparison

of compounds built up of dissimilar elements; this, however, was not the writer's purpose. And a glance at the tables will show that the arrangement is essentially different. All the hydro-carbons are placed together, arranged, as far as possible, in regular series, with reference to their chemical relations. So also all compounds containing carbon, hydrogen, and oxygen, united together without the presence of other elements, and so on. The Table of Contents will doubtless prove a sufficient key to the arrangement.

That the tables are absolutely complete, is not claimed for them, especially as their scope is limited. They contain no determinations of specific gravity for solutions, and all such must be sought for in Storer's "Dictionary of Solubilities." And they contain but few determinations of natural minerals, most of the silicates, especially, being omitted. Again, numerous old determinations of specific gravity are left out, as having been rendered utterly valueless and supplanted by more recent and more accurate observations. In short, all that is claimed for the work is, that it forms a practically complete table of the specific gravities of *artificial compounds of definite constitution*: all else in the table is gratuitous. There are some determinations of specific gravities of natural minerals, chiefly those of comparatively simple composition, quite full sets of observations for most of the chemical elements, and a good number of determinations for the leading alloys. So with the boiling points and melting points; they have been added merely to supplement the specific gravities: but as far as the table claims thoroughness, it will be found complete. Up to June 1, 1871, little has been omitted, except in the cases mentioned above.

There is one obvious objection to the method of arranging determinations of physical constants in tables. Details cannot be given. In many cases there are important questions of detail to be considered. How was a determination made? How was the material obtained? And if several isomers are grouped under one name—as for instance the several butyl alcohols, or the isomeric bodies known as cumol—which one is meant when a specific gravity is given? All these ques-

tions cannot be easily answered in a table of this sort. In order to relieve this difficulty, the references to original papers have been supplied. Almost every determination in the tables is accompanied by such a reference. Some of these, indeed, are not direct references to the paper of the investigator, but to the "Jahresbericht," by means of which, however, the paper itself can be found. Some determinations, nevertheless, lack such references. They were among those which formed the first table, compiled for private use, and which I have not been able since to trace back to their sources.

In conclusion, a brief statement of the extent of the work here presented may be desirable. The table, exclusive of its supplement, contains the specific gravities of 2263 substances, and over 5000 determinations in all. There are over 2000 determinations of boiling point, representing 1205 different substances; and nearly 500 of melting point, for 326 different substances. In all, the names of 2572 distinct bodies will be found in the table. The work may contain errors—especially errors of judgment in arranging the material—but the writer hopes that these are few in number. And he feels sure that all who have experienced the difficulties of preparing such work for the press, will readily pardon the mistakes which may have occurred.

F. W. C.

Boston, April 14th, 1872.

# A LIST

## OF THE MORE IMPORTANT OF THE PAPERS USED IN COMPILING THE FOLLOWING TABLES.

---

### I. Papers upon Atomic Volume and Specific Gravity.


1. W. Herapath.—"Contributions to our knowledge of chemical bodies." Phil. Mag. 64. (1824). 321.
2. Boullay.—"Dissertation sur les modifications que subit le volume des corps solides dans les combinaisons chimiques." Ann. Chim. Phys. (2). 43. (1830). 266. Poggend. Annal. 19. 107.
3. Karsten.—"Verhältniss chemischer Mischung zur Form." Schweig. Journ. 65. (1832). Two papers; pages 320, 394.
4. Kopp.—"Ueber das Volumenometer, ein Instrument zur Bestimmung des Volums fester oder flüssiger Körper." Ann. Chem. Pharm. 35. 17.
5. Kopp.—"Ueber Atomvolum, Isomorphismus, und specifisches Gewicht." Ann. Chem. Pharm. 36. (1840). 1. Ann. Chim. Phys. (2). 75. 406.
6. Kopp.—"Ueber die Vorausbestimmung einiger physikalischen Eigenschaften bei mehreren Reihen organischer Verbindungen." Ann. Chem. Pharm. 41. (1842). Two papers; pages 79, 169.
7. Kopp.—"Recherches sur le volume spécifique." Ann. Chim. Phys. (3). 4. (1842). 462.
8. Kopp.—"Ueber den Zusammenhang zwischen der chemischen Constitution und einigen physikalischen Eigenschaften bei flüssigen Verbindungen." Ann. Chem. Pharm. 50. (1844). 71.
9. Schröder.—"Volumes moléculaires des substances organiques liquides." Ann. Chim. Phys. (3). 13. (1845). 157.
10. Löwig.—"Ueber den Zusammenhang zwischen den Atomvolumen und Atomgewichten der flüssigen organischen Verbindungen." Poggend. Annal. 64. (1845). Two papers; pages 209, 515.
11. Playfair and Joule.—"On atomic volume and specific gravity." Chem. Soc. Memoirs, 2. (1845). 401. Second paper, vol. 3. (1848). 57.

12. Filhol.—"Études sur le rapport qui existe entre le poids atomique, la forme cristalline, et la densité des corps." Ann. Chim. Phys. (3). 21. (1847). 415.

13. Kopp.—"Untersuchungen über das specifische Gewicht, die Ausdehnung durch die Wärme und den Siedpunkt einiger Flüssigkeiten." Poggend. Annal. 72. (1847). Two papers; pages 1, 223.

14. Playfair and Joule.—"Researches upon atomic volume and specific gravity." Journ. Chem. Soc. 1. (1849). Two papers; pages 121, 139.

15. Pierre.—"Mémoire sur la thermométrie, et en particulier sur la comparison du thermomètre à air avec les thermomètres à liquides." Compt. Rend. 27. (1848). 213. Poggend. Annal. 76. 458.

16. Delffs.—Abstract of important paper by. Ann. Chem. Pharm. 92. (1854). 277.

17. Kopp.—"Beiträge zur Stöchiometrie der physikalischen Eigenschaften chemischer Verbindungen." Ann. Chem. Pharm. 96. (1855). Three papers; pages 1, 153, 303.

18. Kopp.—"Untersuchungen über das specifische Gewicht, die Ausdehnung durch die Wärme, und den Siedpunkt einiger Flüssigkeiten." Ann. Chem. Pharm., 94, 257. 95, 307. 98, 367. (1855 and 1856).

19. Kopp.—"Ueber die specifischen Volume der Stickstoffhältigen Verbindungen." Ann. Chem. Pharm. 100. (1856). 19.

20. Schiff.—"Ueber die specifischen Volume einiger Reihen anorganischer Verbindungen." Ann. Chem. Pharm. 107. (1858). 64.

21. Schiff.—"Ueber die specifischen Volume anorganischer Verbindungen." Ann. Chem. Pharm. 108. (1858). 21.

22. D'Andreéff.—Recherches sur le poids spécifique et la dilatation par la chaleur de quelqes gaz condensés." Ann. Chim. Phys. (3). 56. (1859). 317.

23. Schröder.—"Neue Beiträge zur Volumentheorie." Poggend. Annal, 106. (1859). 226. Second paper; 107. 113.

24. Tschermak.—"Ueber den Zusammenhang zwischen der chemischen Constitution und dem relativen Volumen bei flüssigen Verbindungen." Sitzungsb. Wien Akad. 35, 18. Second paper; 37. 525.

25. Schiff.—"Die specifischen Volume starrer Verbindungen." Ann. Chem. Pharm. 112. (1859). 88.

26. Bödeker.—"Die Beziehungen zwischen Dichte und Zusammensetzung bei festen und liquiden Stoffen. Ein Supplement zu den Lehrbüchern der Chemie und Mineralogie." Leipzig. (1860).

27. Tschermak.—"Die Dichte im Verhältnisse zur Form und chemischen Beschaffenheit der Krystalle." Sitzungsb. Wien Akad. 45. (2). (1862). 603.

28. Šafařik.—"Beiträge zur Kenntniss der specifischen Volumen fester Verbindungen." Journ. für Prakt. Chem. 90. (1863). 12.

29. H. L. Buff.—"Ueber eine Beziehung des Gesetzes der multiplen Proportionen zu den specifischen Volumen." Ann. Chem. Pharm. 4th Supp. (1865-6). 129.

30. Louguinine.—"Étude des densités et dilatations de la benzine et de ses homologues."—Ann. Chim. Phys. (4). 11. (1867). 453.

31. Kremers.—"Ueber das relative Volum der Verbindungen erster Ordnung." Poggend. Annal. 130. (1867). 77.

32. Haagen.—"Bestimmung der Brechungsexponenten und specifischen Gewichte einiger flüssigen Haloidverbindungen." Poggend. Annal. 131. (1867). 117.

33. Jungfleisch."—"Sur quelques relations entre les points de fusion, les points d'ebullition, les densités, et les volumes spécifiques." Compt. Rend. 64. (1867). 911.

## II. Papers upon Expansion.

See also several of the papers already cited.

34. Daniell.—"On a new register-pyrometer, for measuring the expansion of solids, and determining the higher degrees of temperature upon the common thermometric scale." Phil. Trans. (1830). 237.

35. Daniell.—"Further experiments with a new register-pyrometer for measuring the expansion of solids." Phil. Trans. (1831). 443.

36. Muncke.—"Ueber die Ausdehnung der tropfbaren Flüssigkeiten durch Wärme." Mem. Acad. St. Petersburg. Savans Etrang. I. (1831). 249.

37. Stampfer.—"Versuche zur Bestimmung des absoluten Gewichts des Wassers, der Temperatur seiner grössten Dichtigkeit und der Ausdehnung derselben." Poggend. Annal. 21. (1831). 75.

38. Muncke.—"Sur la dilatation de l'alcool absolu et du carbure de soufre par la chaleur." Ann. Chim. Phys. (2). 64. (1837). 5.

39. Despretz.—"Recherches sur le Maximum de Densité de l'Eau pure, et des dissolutions aqueuses." Ann. Chim. Phys. (2). 70. (1839). 5.

40. Despretz.—"Observations sur la dilatation du soufre."—Compt. Rend. 7. (1838). 589.

41. Salm-Horstmar.—"Ueber die Ausdehnung des flüssigen Wassers unter dem Gefrierpunkt."—Poggend. Annal. 62. (1844). 283.

42. Brunner.—"Éxperiences sur la densité de la glace à differentes temperatures." Ann. Chim. Phys. (3). 14. (1845). 369.

43. Pierre.—"Recherches sur la dilatation des liquides." Ann. Chim. Phys. (3). 15. (1845). 325.

44. Continuation of No. 43. Ann. Chim. Phys. (3). 19. (1847). 193.

45. Pierre.—"Recherches sur les propriétés physiques des liquides, et en particulier sur leur dilatation." Ann. Chim. Phys. (3). 20. (1847). 5.

46. Pierre.—"Recherches sur la dilatation et sur quelques autres propriétés physiques de l'acide sulfureux anhydre et du sulfite d'oxyde d'ethyle." Ann. Chim. Phys. (3). 21. (1847). 336.

47. Militzer.—"Ueber die Ausdehnung des Quecksilbers durch die Wärme." Poggend. Annal. 80. (1850). 55.

48. Pierre.—"Recherches sur les propriétés physiques des liquides, et en particulier sur leur dilatation." Ann. Chim. Phys. (3). 31. (1851). 118.

49. Pierre.—"Recherches sur la dilatation." Ann. Chim. Phys. (3). 33. (1851). 199.

50.—Kopp.—"Ueber die Ausdehnung einiger fester Körper durch die Wärme." Ann. Chem. Pharm. 81. (1852). 1. Poggend. Annal. 86. 156.

51. Hagen.—"Ueber die Ausdehnung des distillirten Wassers unter verschiedenen Wärmegraden." Abhandl. Akad. d. Wiss. zu Berlin. (1855).

52. Pfaff.—"Untersuchungen über die Ausdehnung der Krystalle durch die Wärme." Poggend. Annal. 104. (1858). 171. Second paper, 107. 148.

53. Drion.—"Note sur la dilatabilité des liquides chauffés à des températures supériéures à celle de leur ebullition." Compt. Rend. 46. (1858). 1235. Poggend. Annal. 105. 158.

54. Sorby.—"On the expansion of water and saline solutions at high temperatures." Phil. Mag. (4). 18. (1859). 81.

55. Hahn.—"On the expansion of crystalline bodies by heat." Phil. Mag. (4). 18. (1859). 155.

56. Mendelejeff.—"Notiz über die Ausdehnung homologer Flüssigkeiten." Ann. Chem. Pharm. 114. (1860). 165.

57. Mendelejeff.—"Ueber die Ausdehnung der Flüssigkeiten beim Erwärmen über ihren Siedepunkt." Ann. Chem. Pharm. 119. (1861). 1.

58. Calvert, Johnson, and Lowe.—"On the expansion of metals and alloys." Chem. News. 3. (1861). Pages 315, 357, 371.

59. Duvenoy.—"Ueber die Ausdehnung des Wassers beim Gefrieren." Poggend. Annal. 117. (1862). 454.

60. Fizeau.—"Recherches sur la dilatation et la double réfraction du cristal de roche echauffé." Ann. Chim. Phys. (4). 2. (1864). 143.

61. Fizeau.—"Sur la dilatation du diamant et du protoxyde du cuivre cristallisé sous l'influence de la chaleur." Compt. Rend. 60. (1865). 1161.

62. Weidner.—"Die Ausdehnung des Wassers bei Temperaturen unter 4° R." Poggend. Annal. 129. (1866). 300.

63. Fizeau.—"Mémoire sur la dilatation des corps solides par la chaleur." Ann. Chim. Phys. (4). 8. (1866). 335.

64. Matthiessen.—"On the expansion by heat of water and mercury." Phil. Trans. (1866). 231.

65. MATTHIESSEN.—"On the expansion by heat of metals and alloys." Phil. Trans. (1866). 861. Poggend. Annal. 130. 50.

66. HIRN.—"Mémoire sur la thermodynamique. Recherches expérimentales sur la dilatation et sur la capacité calorifique a des hautes températures de quelques liquides trés volatiles." Ann. Chim. Phys. (4). 10. (1867). 32.

67. ROSSETTI.—"Sur le maximum de densité et la dilatation de l'eau distillée." Ann. Chim. Phys. (4). 10. (1867). 461. Second paper, v. 17. (1869). 370.

68. FIZEAU.—"Sur la propriété que possède l'iodure d'argent de se contracter par la chaleur et de se dilater par le froid." Compt. Rend. 64. (1867). 314. Another paper, same vol., p. 771.

69. FIZEAU.—"Tableau des dilatations par la chaleur de divers corps simples métalliques ou non métalliques, et de quelques composés hydrogenés du carbone." Compt. Rend. 68. (1869). 1125.

70. PIERRE and PUCHOT.—"Ueber einige Gährungs-Alkohole und Derivate derselben." Ann. Chem. Pharm. 153. (1870). 259.

71. PIERRE and PUCHOT.—"Ueber den Propionyl — den Butyryl — und den Valerylaldehyde." Ann. Chem. Pharm. 155. (1870). 362.

## III. PAPERS UPON BOILING AND MELTING.

72. A. F. and L. F. SVANBERG.—"Versuche über die Erstarrungspunkte ternärer Legirungen aus Zinn, Blei, und Zink." Poggend. Annal. 26. (1832). 280.

73. SCHRÖDER.—"Die Siedhitze der chemischen Verbindungen, das wesentlichste Kennzeichen zur Ermittlung ihrer Componenten." Poggend. Annal. 62. (1844.) Two papers; pages 184, 337.

74. SCHRÖDER.—"Ueber die Siedhitze der chemischen Verbindungen." Poggend. Annal. 64. (1845). 96.

75. PERSON.—"Recherches sur la chaleur latente." "Note sur la loi qui règle la chaleur latente de vaporisation." Compt. Rend. 23. (1846). Two papers; pages 162, 524.

76. REGNAULT.—"Note sur la chaleur specifique de potassium et sur les températures d'ébullition de l'acide carbonique et du protoxyde d'azote sous la pression ordinaire de l'atmosphère." Compt. Rend. 28. (1849). 325.

77. SCHRÖDER.—"Ueber den Einfluss der Elemente auf die Siedhitze." Poggend. Annal. 79. (1850). 34.

78. GROSHANS.—"Bemerkungen über die entsprechenden Temperaturen, die Sied- und Gefrierpunkt der Körper." Poggend. Annal. 78. (1849). 112.

79. KOPP.—"Ueber Siedpunkts-Regelmässigkeiten, und H. Schröder's neueste Siedepunktstheorie." Poggend. Annal. 81. (1850). 374.

80. Bouis.—"Observations sur la fusion et la solidification." Ann. Chim. Phys. (3). 44. (1855). 152.

81. Kopp.—"Ueber die Siedepunkte entsprechenden Brom- und Chlorverbindungen, und die Formeln der Silicium- und Titanverbindungen." Ann. Chem. Pharm. 98. (1856). 265.

82. Kopp.—"Sur quelques regularités dans les points d'ebullition des combinaisons organiques." Ann. Chim. Phys. (3). 49. (1857). 338.

83. Schaffgotsch.—"Ueber zwei ausgezeichnete Beispiele der Schmelzpunktserniedrigung." Poggend. Annal. 102. (1857). 293.

84. Kopp.—"On the relation between boiling point and composition in organic compounds." Phil. Trans. (1860). 257.

85. Kopp.—"Ueber die Siedepunkte der Kohlenwasserstoffe $C_n H_{2n-6}$." Ann. Chem. Pharm. 5th supp. (1867). 315.

86. Tollens.—"Sur les points d'ébullition des composés allyliques." Bull. Soc. Chim. 11. (1869). 398.

# EXPLANATORY NOTES.

Each of the following tables, with two exceptions, is divided into five columns. The first contains the Name of the Substance, the second its Formula, the third its Specific Gravity, the fourth its Boiling Point, and the fifth its Melting Point. From the Table of Elementary Substances, however, the column for formula is omitted; and in the Table of Alloys, no boiling points are given. The authorities are added as foot-notes to each page.

Some abbreviations are necessarily used. In the first column, the letter "s." placed after the name of any substance, shows that that substance is a solid, or was examined in the solid state. The letter "l." similarly used, stands for *liquid*. Thus, "Acetic acid. s.," stands for *solid* acetic acid; and "Chlorine. l.," for *liquefied* chlorine.

Among organic substances, the abbreviations "iso," and the Greek letters alpha or beta are sometimes appended to the name of a substance. These are simply to distinguish isomers from each other; as, for instance, isopropyl from propyl compounds, and alpha- from beta-xylidine.

In the Specific Gravity column the letters "s." and "l." are also employed, and indicate that the determinations to which they are appended are for the substances in question in the solid or liquid state. The letter "a." attached to a determination shows the latter to be merely approximate. Expressions like "m. of 3," "m. of 5," &c., affixed to a number, show it to be a *mean of 3*, *mean of 5*, &c., determinations. And the abbreviations "Precip.," "Artif.," "Cryst.," "Ign.," &c., stand simply for the words precipitated, artificial, crystallized, and ignited, and express of course the character of the material employed in making a determination.

In the column devoted to Boiling Points, the letter "a." is again used to express approximation. Thus, "160° a." stands for *about 160.°* When barometric measurements are given, "m. m." of course stands for millimetres. The plus and minus signs are employed to show that a determination is a

little above or a little below accuracy. 100°+, would mean a little more than 100°, and 100°—, a little less. "d.," or "p.d.," affixed to a boiling point determination, indicates that the substance in question is either *decomposed*, or *partly decomposed* in boiling.

In the column of Melting Points, the letters "a.," "d.," and "p.d.," and the plus and minus signs, are used precisely as with the Boiling Points. The letter "s.," however, shows that the temperature attached is that at which the body named *solidifies*. "rs." stands for *resolidification*. Thus, "82.° rs. 78°" would show that a body melted at 82°, and resolidified at 78.°

In the lists of Authorities a variety of abbreviations are used, to point out the whereabouts of the original paper, or the source from which a determination was obtained. References to "Dana's Mineralogy," "Watts' Dictionary," "Strecker's Lehrbuch," "Kekulé's Lehrbuch," and "Weltzien's Systematische Zusammenstellung der Organischen Verbindungen," will of course be readily recognized. But most of the abbreviations require detailed explanation.

A single number appended to the name of an authority, refers to the list of papers accompanying the tables. Thus, "Kopp. 18," would refer to Kopp's paper numbered 18 in the list; or "Filhol. 12," to Filhol's paper numbered 12.

*Two* numbers affixed to a name, refer to the "Jahresbericht," volume and page. Thus, "Kenngott. 6. 853," refers to vol. 6, p. 853 of the above-named work; or "Luca. 13. 98," to vol. 13, p. 98.

The following abbreviations refer to various periodicals,—the series, (when necessary), volume, and page, being always given. If the number for the series be omitted, the *first* series is understood to be the one referred to. The page is sometimes that at which a paper begins, and sometimes merely that upon which a given determination is to be found.

Ann. Phil. "Annals of Philosophy."

A. C. P. "Annalen der Chemie und Pharmacie."

A. C. Phys. "Annales de Chimie et de Physique."

B. S. C. "Bulletin de la Société Chimique."

Chem. N., or Chem. News. "Chemical News."

Chem. Gaz. "Chemical Gazette."

C. R. "Comptes Rendus."

C. S. J., or J. C. S. "Journal of the Chemical Society."

C. S. Mem. "Chemical Society's Memoirs."

D. P. J., Ding. J., or Dingler's J. "Dingler's Polytechnisches Journal."

Erd. J. "Erdmann's Journal."

Gilb. Ann. "Gilbert's Annalen."

J. F. P. "Journal für Praktische Chemie."

Mem. Amer. Acad. "Memoirs of the American Academy."

Nich. J., or Nich. Journ. "Nicholson's Journal."

P. A. "Poggendorf's Annalen." "Erganz. bd." refers to the "Erganzungs Band."

P. M. "Philosophical Magazine."

P. T., or Phil. Trans. "Philosophical Transactions."

Q. J. S. "Quarterly Journal of Science."

Schw. J., or Schweig. J. "Schweigger's Journal."

S. J., or Sill. J. "Silliman's American Journal."

Wien Ak. "Sitzungsberichte der Akademie zu Wien."

Zeit. An. Chem., or Zeit. Anal. Chem. "Zeitschrift für Analytische Chemie."

# A TABLE
OF
# SPECIFIC GRAVITIES.

## BOILING POINTS AND MELTING POINTS,
## FOR SOLIDS AND LIQUIDS.

### I. Elementary Substances.

| Name. | | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| Hydrogen. | | | | |
| Fluorine. | | | | |
| [1] Chlorine. | l. | 1.33, 15°.5. | | |
| [2] " | | | −33.°6.760.m.m. | |
| [3] Bromine. | | 2.966. | 47.° | |
| [4] " | | 2.98–2.99, 15.° | 45.° | |
| [5] " | | 3.18718, 0.° | 63.°760m.m. | |
| [6] " | | | 58.° " | |
| [7] " | | | | s.—22.° |
| [8] Iodine. | | 4.948. | 175°–180.° | 107.° |
| [9] " | | 4.9173, 40.°3. | | |
| [10] " | | 4.886, 60.° | | |
| [11] " | s. | 4.857, 79.°6. | | |
| [12] " | | 4.841, 89.°8. | | |
| [13] " | | 4.825, 107.° | | |
| [14] " | | 4.004, 107.° | | |
| [15] " | | 3.988, 111.°7. | | |
| [16] " | | 3.944, 124.°3. | | |
| [17] " | l. | 3.918, 133.°5. | | |
| [18] " | | 3.866, 151.° | | |
| [19] " | | 3.796, 170.° | | |
| [20] Lithium. | | 0.578,–0.589. | | 180.° |
| [21] Sodium. | | 0.9348. | | |
| [22] " | | 0.97223, 15.° | | |
| [23] " | | | | s. 97.°6. |
| [24] " | | 0.985. | | |
| [25] " | | | | 95.°6. |

AUTHORITIES.

[1] Watts' Dictionary.
[2] Regnault. 16.70. [337.
[3] Balard. A. C. Phys. (2).32.
[4] Löwig. Watts' Dictionary.
[5] Pierre. 45.
[6] Andrews. P. A. 75.335.
[7] Watts' Dictionary.
[8] Gay-Lussac. A. C. Phys. 1.91.5.
[9] Billet. 8.46.
[10] Billet. 8.46.
[11] Billet. 8.46.
[12] Billet. 8.46.
[13] Billet. 8.46.
[14] Billet. 8.46.
[15] Billet. 8.46.
[16] Billet. 8.46.
[17] Billet. 8.46.
[18] Billet. 8.46.
[19] Billet. 8.46.
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[23] Regnault. 9.43.
[24] Schröder. 12.12.
[25] Bunsen. 16.178.

| | Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Potassium. | 0.865, 15.° | | |
| [2] | " | 0.870. | | |
| [3] | " Melted. | 0.8427. | | |
| [4] | " | | | s. 55.°4. |
| [5] | " | | | 62.°5. |
| [6] | Rubidium. | 1.52. | | 38.°5. |
| [7] | Caesium. | | | |
| [8] | Silver. | | | 1034.° |
| [9] | " | | | 1000.° |
| [10] | " | 10.472. | | |
| [11] | " | 10.362, 10.° | | |
| [12] | " | | | 999.° |
| [13] | " | | | 1024.° |
| [14] | " | 10.43–10.47. | | |
| [15] | " | 10.575. | | |
| [16] | " | 10.4282. | | |
| [17] | " | 10.434. | | |
| [18] | " | 10.522. | | |
| [19] | " | 10.537. | | |
| [20] | " | 10.482. | | |
| [21] | " | 10.505, after fusion. | | |
| [22] | " | 10.5665, pressed. | | |
| [23] | " | 10.5532, precipitated | | |
| [24] | " | 10.6191, powder. | | |
| [25] | " | 10.5287, m. of 13. | | |
| [26] | " | 10.5237, m. of 4. | | |
| [27] | " | 10.5283, m. of 8. | | |
| [28] | " | 10.468, 13.° | | |
| [29] | " | 10.77, 15.°5. Native. | | |
| [30] | " Melted. | 9.131. | | |
| [31] | " " | 9.281. | | |
| [32] | Thallium. | 11.862. | | 290.° |
| [33] | " | 11.808, wire. | | |
| [34] | " | 11.853, cast. | | |

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[21] G. Rose. P. A. 73.1.
[22] G. Rose. P. A. 73.1.
[23] G. Rose. P. A. 73.1.
[24] G. Rose. P. A. 73.1.
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[28] Holzmann. 13.112.
[29] Forbes. P. M. (4). 30.139.
[30] Playfair and Joule. 11.
[31] Playfair and Joule. 11.
[32] Lamy. 15.180.
[33] De la Rive. 16.248.
[34] De la Rive. 16.248.

| Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|
| [1] Thallium. | 11.777. | | |
| [2] « | 11.900. | | |
| [3] « | 11.81, cast. | | |
| [4] « | 11.88, pressed. | | |
| [5] « | 11.91, wire. | | |
| [6] Oxygen. | | | |
| [7] Sulphur. | 1.9907, roll. | | |
| [8] « | 1.868, « | | |
| [9] « | 2.086, flowers. | | |
| [10] « | 1.898, crystallized. | | |
| [11] « | 1.927, from solution. | | |
| [12] « | 1.989, crystallized. | | |
| [13] « | 1.9777–2.0000, roll. | | |
| [14] « | 2.072, prismatic. | | |
| [15] « | 2.086, native. | | |
| [16] « | 2.027, soft. | | |
| [17] « | 2.05001, native. | | |
| [18] « | 1.9889, from fusion. | | |
| [19] « | | 440.° | |
| [20] « | 1.982, prismatic. | | |
| [21] « | 2.066, native. | | 111.°5. |
| [22] « | 2.0518, from solution. | | |
| [23] « | 1.957, soft. | | |
| [24] « | | | 115.° |
| [25] « | 1.919, soft. | | |
| [26] « | 1,928, « | | |
| [27] « | 1.958, prismatic. | | |
| [28] « | 2.070, native. | | |
| [29] « | 2.063, from solution. | | |
| [30] « | 2.010, crystallized. | | |
| [31] « | 1.913, flowers. | | |
| [32] « | 1.921, waxy. | | |

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[9] Gehler.
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[11] Bischof.
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[24] Person. 1.73. [365.
[25] C. J. St. Claire Deville. 1.
[26] C. J. St. Claire Deville. 1. 365.
[27] C. J. St. Claire Deville. 1. 365.
[28] C. J. St. Claire Deville. 1. 365.
[29] C. J. St. Claire Deville. 1. 365.
[30] Playfair and Joule. 11.
[31] Playfair and Joule. 11.
[32] Playfair and Joule. 11.

| | Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Sulphur. Melted. | 1.801. } Extremes of five | | |
| [2] | " " | 1.815. } determinations. | | |
| | | | | 114.°5. Octahedral. |
| [3] | " | | | 120.° Prismatic. |
| [4] | " | | | |
| [5] | " | | 490.°760 m. m. | |
| [6] | " | | 447.° | |
| [7] | Selenium. | 4.3–4.32. | | |
| [8] | " | 4.31. | | |
| [9] | " | 4.808, 15.° | | 217.° |
| [10] | " | 4.805. } crystallized | | |
| [11] | " | 4.796. } from fusion. | | |
| [12] | " | 4.276. } 20.° | | |
| [13] | " | 4.286. } Amorphous. | | |
| [14] | " | 4.245. } Red. | | |
| [15] | " | 4.275. } Precipitated. | | |
| [16] | " | 4.250. } Ditto, after | | |
| [17] | " | 4.297. } heating to 50.° | | |
| [18] | " | 4.460. } | | |
| [19] | " | 4.509. } Crystallized. | | |
| [20] | " | 4.700. } | | |
| [21] | " | 4.760. } 15.°crystallized | | |
| [22] | " | 4.788. } from solution. | | |
| [23] | " | 4.80. } Black. | | |
| [24] | " | 4.81. } | | |
| [25] | " | 4.26. } Red. | | |
| [26] | " | 4.28. } Precipitated. | | |
| [27] | Tellurium. | 6.115. | | |
| [28] | " | 6.138. | | |
| [29] | " | 6.2445, m. of 5. | | |
| [30] | " | 6.343. | | |
| [31] | " | 6.180. | | |
| [32] | " | | | a. 500.° |

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[13] Schaffgotsch. 6.329.
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[19] Mitscherlich. 8.314.
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[30] Reichenstein.
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| Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|
| [1] Calcium. | 1.566. | | |
| [2] « | 1.584. | | |
| [3] « | 1.584. | | |
| [4] « | 1.55. | | |
| [5] « | 1.6–1.8. | | |
| [6] Strontium. | 2.504. | | |
| [7] « | 2.580. | | |
| [8] « | 2.4. | | |
| [9] Barium. | a. 4.00. | | |
| [10] Lead. | 11.445. | | |
| [11] « | 11.352. | | |
| [12] « | 11.207. | | |
| [13] « | 11.388. | | |
| [14] « | 11.3393. | | 334.° |
| [15] « | 11.346, 15.°5. | | s. 322.° |
| [16] « | 11.352. | | |
| [17] « | | | 322.° |
| [18] « | 11.3888. | | |
| [19] « | 11.070. | | |
| [20] « | 11.275. | | |
| [21] « | 11.280. | | |
| [22] « | 11.298. | | |
| [23] « | | | 332.° |
| [24] « | | | 326.° |
| [25] « | 11.370, 0.° | | |
| [26] « | 11.3525, 18.° | | |
| [27] « | 11.395, 4.° | | |
| [28] « | 11.254–11.363. | | |
| [29] « | 11.376, 14.° | | |
| [30] « | 10.450. | | |
| [31] « Melted. | 10.513. | | |
| [32] « | 10.563. | | |

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[16] Herapath. 1.
[17] Daniell. 34.
[18] Karsten. 3.
[19] Playfair and Joule. 11.
[20] Playfair and Joule. 11.
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[22] Playfair and Joule. 11.
[23] Person. 1.72.
[24] Rudberg. 1.71.
[25] Reich.
[26] Reich.
[27] Streng.
[28] C. St. Claire Deville. 8.15.
[29] Holzmann. 13.112.
[30] Playfair and Joule. 11.
[31] Playfair and Joule. 11.
[32] Playfair and Joule. 11.

| | Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Indium. | 7.110. In grains. | | |
| [2] | " | 7.147. 20.°4. | | |
| [3] | " | 7.277. In laminæ. | | |
| [4] | " | 7.362, 15.° | | |
| [5] | " | 7.421, 16.°8. | | 176.° |
| [6] | Chromium. | 7.3. | | |
| [7] | " | 6.81, 25.° Crystallized. | | |
| [8] | " | 6.20. Reduced by K Cy. | | |
| [9] | Manganese. | 6.861–7.10. | | |
| [10] | " | 8.03. | | |
| [11] | " | 8.013. | | |
| [12] | " | 7.138–7.206. | | |
| [13] | Iron. | 7.4839, bar. | | |
| [14] | " | 7.8707. | | |
| [15] | " | 7.865. | | |
| [16] | " | 7.788. | | |
| [17] | " | 7.790, wrought. | | |
| [18] | " | 7.130. Reduced by C. | | |
| [19] | " | 8.1393, 15.°5. Electrolytic. | | |
| [20] | " | 7.50. Reduced by | | |
| [21] | " | 7.84. zinc vapor. | | |
| [22] | " | 7.6305. Wire in sev- | | |
| [23] | " | 7.6000. eral differ- | | |
| [24] | " | 7.7169. ent condi- | | |
| [25] | " | 7.7312. tions. | | |
| [26] | " | 7.7433. Hammered. | | |
| [27] | " | 7.998. 10.° | | |
| [28] | " | 8.007. Reduced by H. | | |
| [29] | " | 6.03. Reduced by H. | | |
| [30] | " Meteoric. | 7.318. From Guilford. | | |
| [31] | " " | 7.82. | | |
| [32] | " " | 7.814. | | |

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[4] Winkler. 18.233.
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[6] Bunsen.
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[8] Loughlin. 21.220.
[9] Bergmann. } See 11.
[10] Bachmann. }
[11] John. P. M. 2.176.
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[25] Baudrimont. J. F. P. 7.268.
[26] Baudrimont. J. F. P. 7.268.
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[28] Schiff. }
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[31] Rumler. See 23.
[32] Patera. See 23.

| Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|
| [1] Nickel. | 7.807. | | |
| [2] " | 8.279. | | |
| [3] " | 8.380. | | |
| [4] " | 8.402. | | |
| [5] " | 8.477. | | |
| [6] " | 8.637. | | |
| [7] " | 7.861. } Reduced by | | |
| [8] " | 7.803. } hydrogen. | | |
| [9] " | 8.88, 4.° Wire. | | |
| [10] " | 8.975. } Reduced by | | |
| [11] " | 9.261. } hydrogen. | | |
| [12] " | 8.900. | | |
| [13] Cobalt. | 8.710. | | |
| [14] " | 8.485. | | |
| [15] " | 8.500. | | |
| [16] " | 8.513. | | |
| [17] " | 8.538. | | |
| [18] " | 8.558. | | |
| [19] " | 7.718. } Reduced by | | |
| [20] " | 8.260. } hydrogen. | | |
| [21] " | 8.957. Red. by H.m.of 5. | | |
| [22] Uranium. | 18.40. | | |
| [23] " | 18.33. | | |
| [24] Copper. | | | 1000°–1200°. |
| [25] " | | | 1207.° |
| [26] " | 8.895. | | |
| [27] " | 8.878, rolled. } | | |
| [28] " | 8.788, cast. } | | |
| [29] " | 8.83, cast. } | | |
| [30] " | 8.9463, drawn. } | | |
| [31] " | 8.9587, hammered. } | | |
| [32] " | 8.78. | | |
| [33] " | 8.900. | | |

AUTHORITIES.

[1] Brisson.
[2] Richter.
[3] Tupputi.
[4] Tourte.
[5] Baumgartner.
[6] Brunner.
} See 11.

[7] Playfair and Joule. 11.
[8] Playfair and Joule. 11.
[9] Arndtsen. See 23.
[10] Rammelsberg. 2.282.
[11] Rammelsberg. 2.282.
[12] Schröder. 23.
[13] Lampadius. Erd. J. (1). 5. 390.
[14] Brunner.
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[16] Berzelius.
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[18] T. H. Henry.
} See 11.

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[29] Berzelius.
[30] Berzelius.
[31] Berzelius.
} See the paper by Marchand & Scheerer. J. F. P. 27.193.

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[33] Herapath. 1.

| Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|
| [1] Copper. | | | 1091.° |
| [2] " | 8.667. | | |
| [3] " | 8.721. | | |
| [4] " | 8.6225. Wire, in several different conditions. | | |
| [5] " | 8.3912. | | |
| [6] " | 8.7059. | | |
| [7] " | 8.8787. | | |
| [8] " | 8.8893, hammered. | | |
| [9] " | 8.940, crystallized. | | |
| [10] " | 8.921, cast. | | |
| [11] " | 8.939. Various sorts of wire. | | |
| [12] " | 8.949. | | |
| [13] " | 8.930. | | |
| [14] " | 8.951. | | |
| [15] " | 8.952, sheet. | | |
| [16] " | 8.931, pressed. | | |
| [17] " | 8.914, electrolytic. | | |
| [18] " | 8.428. Finely divided. | | |
| [19] " | 8.483. | | |
| [20] " | 8.360. | | |
| [21] " | 8.884. Electrolytic. | | |
| [22] " | 8.941. | | |
| [23] " | 8.934. | | |
| [24] " | 8.367. 4.° Finely divided. | | |
| [25] " | 8.41613. | | |
| [26] " | 8.902, 12.° | | |
| [27] " | 8.838, native. | | |
| [28] " | 8.952–8.958. | | |
| [29] " | 8.916. Electrolytic, cast. | | |
| [30] " | 8.958. | | |
| [31] " | 8.853. Electrolytic, wire. | | |
| [32] " | 8.733. | | |
| [33] Ruthenium. | 11.0–11.4. | | |

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[2] Mallet. Ding. J. 85.378.
[3] Karsten. 3.
[4] Baudrimont. J. F. P. 7.287.
[5] Baudrimont. J. F. P. 7.287.
[6] Baudrimont. J. F. P. 7.287.
[7] Baudrimont. J. F. P. 7.287.
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[10] Marchand and Scheerer. J. F. P. 27.193.
[11] Marchand and Scheerer. J. F. P. 27.193.
[12] Marchand and Scheerer. J. F. P. 27.193.
[13] Marchand and Scheerer. J. F. P. 27.193.
[14] Marchand and Scheerer. J. F. P. 27.193.
[15] Marchand and Scheerer. J. F. P. 27.193.
[16] Marchand and Scheerer. J. F. P. 27.193.
[17] Marchand and Scheerer. J. F. P. 27.193.
[18] Playfair and Joule. 11.
[19] Playfair and Joule. 11.
[20] Playfair and Joule. 11.
[21] Playfair and Joule. 11.
[22] Playfair and Joule. 11.
[23] Playfair and Joule. 11.
[24] Playfair and Joule. 14.
[25] Playfair and Joule. 14.
[26] Schiff.
[27] Whitney. 12.769.
[28] Schröder. 23.
[29] Dick. P. M. (4). 11.409.
[30] Dick. P. M. (4). 11.409.
[31] Dick. P. M. (4). 11.409.
[32] Dick. P. M. (4). 11.409.
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| | Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Rhodium. | 11.0. | | |
| [2] | " | 11.2. | | |
| [3] | " | 11.0. | | |
| [4] | " | 12.1. | | |
| [5] | Palladium. | 11.3–11.8. | | |
| [6] | " | 12.148. | | |
| [7] | " | 11.852. | | |
| [8] | " | 12.0. | | |
| [9] | " | 11.041, 18.° | | |
| [10] | " | 10.923. | | |
| [11] | " | 11.628. | | |
| [12] | " | 11.30. | | |
| [13] | " | 11.80, hammered. | | |
| [14] | " | 11.752. | | |
| [15] | " | 11.4, 22.°5. | | |
| [16] | Platinum. | 20.85. | | |
| [17] | " | 20.98. | | |
| [18] | " | 21.06. | | |
| [19] | " | 19.5, cast. | | |
| [20] | " | 20.3, hammered. | | |
| [21] | " | 21.0, wire. | | |
| [22] | " | 21.7, wire. | | |
| [23] | " | 21.061. | | |
| [24] | " | 21.45. | | |
| [25] | " | 21.47–21.53. | | |
| [26] | " | 17.7, cast. | | |
| [27] | " | 21.3. | | |
| [28] | " | 20.9, hammered. | | |
| [29] | " | 21.47, spongy. | | |
| [30] | " | 21.16, wire. | | |
| [31] | " | 21.4, wire. | | |
| [32] | " | 21.53. wire. | | |
| [33] | " | 21.25, hammered. | | |

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| Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|
| [1] Platinum. | 17.572. } | | |
| [2] « | 15.780. } Spongy. | | |
| [3] « | 16.319. } | | |
| [4] « | 17.89. Platinum black. | | |
| [5] « | 21.2668. } O.° | | |
| [6] « | 21.3092. } | | |
| [7] « | 21.31. } | | |
| [8] « | 21.16. } Hammered. | | |
| [9] « | 21.23. } | | |
| [10] « | 16.634, spongy. | | |
| [11] « | 20.9815. } | | |
| [12] « | 20.7732. } Black. | | |
| [13] « | 22.8926. } Precipitated. | | |
| [14] « | 22.0345. } | | |
| [15] « | 26.1418, 15.°7. (?) Black. | | |
| [16] « | 17.766, black. | | |
| [17] « | 21.169. } Spongy. | | |
| [18] « | 21.243. } | | |
| [19] « | 21.15. | | |
| [20] « | 21.15. | | |
| [21] Iridium. | 18.68, porous globule. | | |
| [22] « | 21.78. } | | |
| [23] « | 21.83. } | | |
| [24] « | 18.6088, black. | | |
| [25] « | 21.15. | | |
| [26] Osmium. | 21.40. | | |
| [27] Molybdenum. | 8.490. 8.615. 8.636. | | |
| [28] « | 8.60. | | |
| [29] « | 8.56, reduced by K Cy. | | |
| [30] Tungsten. | 17.6. | | |
| [31] « | 17.22. | | |
| [32] « | 17.4. | | |
| [33] « | 19.261, 12.° | | |

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| | Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Tungsten. | 16.54. | | |
| [2] | « | 17.50. | | |
| [3] | « | 18.26. | | |
| [4] | « | 17.1–17.3. Red. by H. | | |
| [5] | « | 17.9–18.12. « « C. | | |
| [6] | « | 16.6. Prepared by three different methods. | | |
| [7] | « | 17.2. | | |
| [8] | « | 18.447, 17.° | | |
| [9] | Zinc. | 6.861. | | |
| [10] | « | 6.862. | | |
| [11] | « | | | 412.° |
| [12] | « | 6.9154. | | |
| [13] | « | 6.869. 6.992. 6.956. | | |
| [14] | « | | | 423.° |
| [15] | « | 7.03–7.20. | | |
| [16] | « | 6.966–6.975, 12.° | | |
| [17] | « | | 1040.° | |
| [18] | « | 7.21. | | |
| [19] | « | 7.146. | | |
| [20] | « | 6.895. | | |
| [21] | « Melted. | 6.522. 6.511. 6.504. | | |
| [22] | Cadmium. | 8.604. | | |
| [23] | « | 8.670. | | |
| [24] | « | 8.650. | | |
| [25] | « | 8.6355. | | |
| [26] | « | | | 315.° |
| [27] | « | | | 320.° |
| [28] | « | | | 320.° |
| [29] | « | | 860.° | |
| [30] | « | 8.655, 11.° | | |
| [31] | « | 8.54, Pure. | | |
| [32] | « | 8.566, Pure. | | |
| [33] | « | 8.667, Pure. | | |
| [34] | « | 8.648, commercial. | | |

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[30] Matthiessen. 13.112.
[31] Schröder. 23.
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[33] Schröder. 23.
[34] Schröder. 23.

| Name. | | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Magnesium. | | 2.24. | | |
| [2] " | | 1.7430. 5.° | | |
| [3] " | | 1.69–1.71, 17.° | | |
| [4] | | 1.75. | | |
| [5] Mercury. | Solid. | 14.391. | | |
| [6] " | " | 14.485,–60.° | | |
| [7] " | " | 14.0, a. | | |
| [8] " | " | 15.19. | | |
| [9] " | Liquid. | 13.568, 15.° 5. | 346.°5. | |
| [10] " | " | | 356.°25. | |
| [11] " | " | 13.613, 10.° | | |
| [12] " | " | | 349.° | |
| [13] " | " | 13.568. | | |
| [14] " | " | 13.575. | | |
| [15] " | " | | | —39.°44. |
| [16] " | " | | 360.° | |
| [17] " | " | 13.5886, 4.° | | |
| [18] " | " | 13.535, 26.° | | |
| [19] " | " | 13.588597. | | |
| [20] " | " | 13.5592. | | |
| [21] " | " | 13.59599. | | |
| [22] " | " | 13.59602. 0.° | | |
| [23] " | " | 13.59578. | | |
| [24] " | " | 13.595, 0.° | | |
| [25] " | " | 13.573, 15.° | | |
| [26] " | " | | 357.°25. 760m.m. | |
| [27] " | " | 13.603, 12.° | | |
| [28] " | " | 13.569, 16.°6. | | |
| [29] Nitrogen. | | | | |
| [30] Boron. | | 2.68. Crystallized. | | |
| [31] Phosphorus. | | | 250.° | |
| [32] " | | | 288.° | |
| [33] " | | | 290.° | |

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| | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Phosphorus. Common. | 1.77. | | |
| [2] | " " | 2.09. | | |
| [3] | " " | 1.800. | | |
| [4] | " " | | | 44.°2. |
| [5] | " " | | | 44.°2. |
| [6] | " " | 1.826–1.840, 10.° | | |
| [7] | " " | 1.8262–1.8265, 10.° | | |
| [8] | " " | 1.823, 35.° | | |
| [9] | " Melted. | 1.744. | | |
| [10] | " " | 1.88, 45.° | | |
| [11] | " " | 1.763, { Cooled below melting point. | | |
| [12] | " Red. | 1.964, 10.° | | |
| [13] | " " | 2.089–2.106, 17.° | | |
| [14] | " " | 2.14.} Crystallized. | | |
| [15] | " " | 2.23.} Two preparations. | | |
| [16] | " " | 2.34, 15.°5. "Metallic." | | |
| [17] | Vanadium. | 5.5, 15.° | | |
| [18] | Arsenic. | 5.763. | | |
| [19] | " | 5.766. | | |
| [20] | " | 5.763. | | |
| [21] | " | 5.884. | | |
| [22] | " | 5.700–5.959. | | |
| [23] | " | 5.672. | | |
| [24] | " | 5.6281. | | |
| [25] | " | 5.736, native. | | |
| [26] | " | 5.722–5.734, native. | | |
| [27] | " | 5.230. | | |
| [28] | " | 5.395, 12.°5. | | |
| [29] | " | 5.726,–5.728, 14.° | | |
| [30] | " Fused. | 5.709, 19.° | | |
| [31] | " Amorphous. | 4.710–4.716, 14.° | | |
| [32] | Antimony. | 6.702. | | |
| [33] | " | 6.712. | | |
| [34] | " | 6.733. | | |

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[33] Hatchett. } See 11.
[34] Böckmann.

| | Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] | Antimony. | 6.852. | | |
| [2] | " | 6.860. | | |
| [3] | " | 6.646. | | |
| [4] | " | 6.610. | | |
| [5] | " | 6.7006. | | |
| [6] | " | 6.715. | | |
| [7] | " | 6.707–6.718; 17° to 21.° | | |
| [8] | " | 6.713, 14.° | | |
| [9] | " | 6.697. | | |
| [10] | " | | | 450.° |
| [11] | " Melted. | 6.646–6.529. | | |
| [12] | " Amorphous. | 5.74–5.83. | | |
| [13] | Bismuth. | 9.67. | | |
| [14] | " | 9.822. | | |
| [15] | " | 9.800. | | |
| [16] | " | 9.882. | | |
| [17] | " | 9.8827. | | |
| [18] | " | 9.831. | | |
| [19] | " | 9.6542. | | |
| [20] | " | 9.799, 19°, pure. | | |
| [21] | " | 9.783, commercial. | | |
| [22] | " | 9.556, after great pressure. | | |
| [23] | " | | | 268.°3. |
| [24] | " | | | 270.° |
| [25] | " | | | 264.° |
| [26] | " | 9.935, crystallized. | | |
| [27] | " | 9.677, quickly cooled. | | |
| [28] | " | 9.823, 12.° | | |
| [29] | " Melted. | 9.811, 9.756, 9.905, 9.721. | | |
| [30] | " | 9.759, 9.701, 9.680. | | |
| [31] | Gold. | 19.258. | | |
| [32] | " | 19.207, hammered. | | |
| [33] | " | 19.3–19.4. | | |

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[31] Brisson. See 11.
[32] Elliot. [33] Lewis. } See Rose's paper.

| | Name. | | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Gold. | | | | 1200.° |
| [2] | " | | | | 1380.° |
| [3] | " | | | | 1144.° |
| [4] | " | | 19.3336, 17.°5, pressed. | | |
| [5] | " | | 19.7439. 17.°5. Precipitated with $FeSO_4$. | | |
| [6] | " | | 20.6882. Extremes of 8 det. | | |
| [7] | " | | 19.4791. Precip. by oxalic acid. | | |
| [8] | " | | 19.4941. " " " | | |
| [9] | " | | 19.265, 13.° | | |
| [10] | Carbon. | Diamond. | 3.550. | | |
| [11] | " | " | 3.492. | | |
| [12] | " | " | 3.520. | | |
| [13] | " | " | 3.334. | | |
| [14] | " | " | 3.5. | | |
| [15] | " | " | 3.55. | | |
| [16] | " | " | 3.5295. | | |
| [17] | " | " | 3.53. From Bohemia. | | |
| [18] | " | Graphite. | 2.14. | | |
| [19] | " | " | 2.229. | | |
| [20] | " | " | 2.273. | | |
| [21] | " | " | 2.14. | | |
| [22] | " | " | 2.5. | | |
| [23] | " | " | 2.3285. | | |
| [24] | " | " | 2.3162. | | |
| [25] | " | " | 1.802. 20.° | | |
| [26] | " | " | 1.844. Purified. | | |
| [27] | " | " | 2.25–2.26. " | | |
| [28] | " | " | 2.105. Extremes of 29 determinations, of samples fr. different localities. | | |
| [29] | " | " | 2.585. | | |
| [30] | " | Gas Carbon. | 1.885. | | |
| [31] | Silicon. | Graphitoidal. | 2.49, 10.° | | |
| [32] | " | " | 2.493. | | |
| [33] | " | " | 2.004. 2.194. 2.197. | | |

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[26] Löwe. 8.297.
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[28] Mené. 20.972.
[29] Mené. 20.972.
[30] Mené. 20.972.
[31] Wöhler. 9.347.
[32] Harmening. See 23.
[33] Winkler. 17.208 and 209.

| Name. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|
| [1] Titanium. | | | |
| [2] Tin. | 7.291. | | |
| [3] " | 7.295. | | |
| [4] " | 7.278, 15.°5. | | s. 238.° |
| [5] " | 7.2911, 17.° | | |
| [6] " | 7. 285. 7.600. | | |
| [7] " | 7.5565, cast. | | |
| [8] " | | | 228.° |
| [9] " | 7.2905. | | |
| [10] " | 7.245. 7.363. 7.330. 7.288 | | |
| [11] " | | | 228.°5. |
| [12] " | | | 235.° |
| [13] " | 7.178, crystallized. | | |
| [14] " | 7.293, cast. | | |
| [15] " | 7.3043. | | |
| [16] " | 7.239. 7.373. | | |
| [17] " | 7.294, 13.° | | |
| [18] " | 7.291. | | |
| [19] " Melted. | 6.949. 6.913. 6.940. | | |
| [20] Zirconium. | 4.15. | | |
| [21] Aluminum. | 2.50, cast. | | |
| [22] " | 2.67, hammered. | | |
| [23] Glucinum. | 2.1. | | |
| [24] Lanthanum. | | | |
| [25] Didymium. | | | |
| [26] Cerium. | 5.5, 12.° | | |
| [27] Yttrium. | | | |
| [28] Erbium. | | | |
| [29] Thorium. | 7.657. 7.795. | | |
| [30] Tantalum. | 10.08–10.78. | | |
| [31] Niobium. | 6.0–6.6. Contains | | |
| [32] " | 6.15–7.37. hydrogen. | | |

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[29] Chydenius. 16.194.
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## II. Fluorides. Inorganic.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Hydrogen fluoride. l. | H F. | .9885, 13.°6. | | |
| [2] " " l. | " | 1.036, 15.°5. | | |
| [3] " " l. | " | .9922, 11.° | | |
| [4] " " l. | " | .9879, 12.°7. | | |
| [5] " " l. | " | 1.0609. | | |
| [6] Potassium " | K F. | 2.454, 12.° | | |
| [7] Silver " | Ag F. | 5.852, 15.°5. | | |
| [8] Calcium " | Ca $F_2$. | 3.183. m. of 60. | | |
| [9] " " | " | 3.15. American. | | |
| [10] " " | " | 3.138. | | |
| [11] " " | " | 3.162. Very pure. | | |
| [12] Barium " | Ba $F_2$. | 4.58, 13.° | | |
| [13] Aluminum " | $Al_2 F_6$. | 3.065. 12.° | | |
| [14] " " | " | 3.13. | | |
| [15] Arsenic trifluoride. | As $F_3$. | l. 2.73. | 63.° | |
| [16] Fluocerite. | Ce $F_2$. $Ce_2 F_6$. | 4.7. | | |
| [17] Hydro ammonic fluoride. | Am H $F_2$. | 1.211, 12.° | | |
| [18] Potassio titanic " | 2 K F. Ti $F_4$. | 2.0797, 12.° | | |
| [19] Cryolite. Greenland. | 3 Na F. Al $F_3$. | 2.90–3.077. | | |
| [20] " Miask. | " | 2.692. | | |
| [21] " " | " | 2.95. | | |
| [22] Chiolite. | 3 Na F. 2 Al $F_3$. | 2.72. | | |
| [23] " | " | 2.90. | | |
| [24] " | " | 2.842.–2.898. | | |
| [25] Chodneffite. | 2 Na F. Al $F_3$. | 3.003.–3.077. | | |
| [26] " | " | 2.62–2.77. | | |

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## III. Inorganic Chlorides.

### 1st. ANHYDROUS SIMPLE CHLORIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Hydrogen chloride. | H Cl. | l. 1.27. | | |
| [2] Iodine mono chloride. | I Cl. | | | 25.° |
| [3] Iodine tri chloride. | $I Cl_3$. | | | 20°–25.° |
| [4] Lithium chloride. | Li Cl. | 1.998. | | |
| [5] " " | " | 2.074. | | |
| [6] Sodium " | Na Cl. | 2.030. | | |
| [7] " " | " | 2.15. | | |
| [8] " " | " | 2.2001. | | |
| [9] " " | " | 2.078. | | |
| [10] " " | " | 2.150. | | |
| [11] " " | " | 2.011. m. of 3. | | |
| [12] " " | " | 2.26. | | |
| [13] " " | " | 2.24. | | |
| [14] " " | " | 2.204. } | | |
| [15] " " | " | 2.195. } | | |
| [16] " " | " | 2.142. } | | |
| [17] " " | " | 2.207. } | | |
| [18] " " | " | 2.135. { Native. Pure. Cryst. | | |
| [19] " " | " | 2.148. | | |
| [20] " " | " | 2.153. } | | |
| [21] " " | " | 2.161. } | | |
| [22] " " | " | 2.145. | | |
| [23] " " | " | 2.1629, 15.° | | |
| [24] " " | " | 2.1543. | | |
| [25] Potassium " | K Cl. | 1.836. | | |
| [26] " " | " | 1.9153. | | |
| [27] " " | " | 1.945. | | |
| [28] " " | " | 1.9367. | | |

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[10] Kopp. 5.
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[12] Mohs. See 23.
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[14] } Deville. See 23.
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[20] } Schröder. 23.
[21] } Schröder. 23.
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[24] Haagen. 32.
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[27] Kopp. 5.
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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Potassium chloride. | K Cl. | 1.900. | | |
| [2] | " " | " | 1.97756, 4.° | | |
| [3] | " " | " | 1.994. | | |
| [4] | " " | " | 1.995. | | |
| [5] | " " | " | 1.995. | | |
| [6] | " " | " | 1.986. | | |
| [7] | " " | " | 1.94526, 15.° | | |
| [8] | Ammonium " | $NH_4$ Cl. | 1.450. | | |
| [9] | " " | " | 1.54425. | | |
| [10] | " " | " | 1.528. | | |
| [11] | " " | " | 1.578. m. of 3. | | |
| [12] | " " | " | 1.5333. 4.° | | |
| [13] | " " | " | 1.500. | | |
| [14] | " " | " | 1.522. | | |
| [15] | " " | " | 1.550. | | |
| [16] | " " | " | 1.5033. | | |
| [17] | " " | " | 1.5191. 15.° | | |
| [18] | " " | " | 1.5209. | | |
| [19] | Silver " | Ag Cl. | 5.4548. | | |
| [20] | " " | " | 5.129. | | |
| [21] | " " | " | 5.4582. Fused. | | |
| [22] | " " | " | 5.5671. Blackened. | | |
| [23] | " " | " | 5.501. Unfused. | | |
| [24] | " " | " | 5.548. | | |
| [25] | " " | " | 5.55. | | |
| [26] | " " | " | 5.31. Native. | | |
| [27] | " " | " | 5.43. | | |
| [28] | " " | " | 5.517. | | |
| [29] | " " | " | 5.5943. | | |
| [30] | " " | " | | | 260. |
| [31] | Thallium chloride. | Tl Cl. | 7.00. | | |
| [32] | " " | " | 7.02. | | |
| [33] | " " | " | | | 260.°+ |
| [34] | " sesqui chloride. | $Tl_2$ $Cl_3$. | 5.9. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | For compounds of Cl and O, see oxides. | | | | |
| [2] | Sulphur chloride. | $S_2 Cl_2$. | 1.687. l. | 138.° | |
| [3] | " " | " | 1.686. l. | 139.° | |
| [4] | " " | " | 1.6802.16°7. l. | | |
| [5] | " " | " | 1.7055.0.° l. | 144.° | |
| [6] | " " | " | | 136.° 760m.m | |
| [7] | " " | " | 1.6828, 20.° l. | 137°7. 761.4 [m. m. | |
| [8] | Marchand and Dumas also obtained a mixture which they supposed to be $S Cl_2$. | Mixture near $S Cl_2$. | 1.625. l.<br>1.62. l. | Variable.<br>64.° | |
| [9] | Calcium chloride. | $Ca Cl_2$. | 2.214. | | |
| [10] | " " | " | 2.269. | | |
| [11] | " " | " | 2.0401. | | |
| [12] | " " | " | 2.480. | | |
| [13] | " " | " | 2.240. | | |
| [14] | " " | " | 2.205. | | |
| [15] | Strontium chloride. | $Sr Cl_2$. | 2.8033. | | |
| [16] | " " | " | 2.960. | | |
| [17] | Barium " | $Ba Cl_2$. | 3.860. | | |
| [18] | " " | " | 4.156. | | |
| [19] | " " | " | 3.8. | | |
| [20] | " " | " | 3.7037. | | |
| [21] | " " | " | 3.750. | | |
| [22] | " " | " | 3.820. | | |
| [23] | " " | " | 3.872. | | |
| [24] | " " | " | 3.886. | | |
| [25] | Lead " | $Pb Cl_2$. | 5.29. | | |
| [26] | " " | " | 5.238. Native. | | |
| [27] | " " | " | 5.6824. Fused. | | |
| [28] | " " | " | 5.8022. Not " | | |
| [29] | " " | " | 5.802. Cryst. | | |
| [30] | " " | " | 5.78. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lead chloride. Cryst. | $Pb\ Cl_2$. | 5.80534, 15.° | | |
| [2] Chromic chloride. | $Cr_2\ Cl_6$. | 3.03, 17.° Cryst. | | |
| [3] Ferrous " | $Fe\ Cl_2$. | 2.528. | | |
| [4] Nickelous " | $Ni\ Cl_2$. | 2.56. | | |
| [5] Cobaltous " | $Co\ Cl_2$. | 2.937. m. of 3. | | |
| [6] Cuprous " | Cu Cl. | 3.6777. | | |
| [7] " " | " | 3.376. | | |
| [8] Cupric " | $Cu\ Cl_2$. | 3.054. | | |
| [9] Platinous " | $Pt\ Cl_2$. | 5.8696, 11.° | | |
| [10] Tungsten hex chloride. | $W\ Cl_6$. | | | 218.° |
| [11] Zinc chloride. | $Zn\ Cl_2$. | 2.753, 13.° | | |
| [12] Magnesium chloride. | $Mg\ Cl_2$. | 2.177. m. of 2. | | |
| [13] Cadmium " | $Cd\ Cl_2$. | 3.6254, 12.° | | |
| [14] Mercurous " | Hg Cl. | 7.1758. | | |
| [15] " " | " | 7.14. | | |
| [16] " " | " | 6.9925. | | |
| [17] " " | " | 6.7107. | | |
| [18] " " | " | 6.482, Native. | | |
| [19] " " | " | 7.178. | | |
| [20] " " | " | 6.56. | | |
| [21] Mercuric " | $Hg\ Cl_2$. | 5.14. | | |
| [22] " " | " | 5.1398. | | |
| [23] " " | " | 5.42. | | |
| [24] " " | " | 5.4032. | | |
| [25] " " | " | | 295.° | 265. |
| [26] " " | " | 6.223. | | |
| [27] " " | " | 5.448. m. of 3. | | |
| [28] Nitrogen trichloride. | $N\ Cl_3$. (?) | 1.653. l. | | |
| [29] Boron " | $B\ Cl_3$. | 1.35. l. | 17.° 760 m. m. | |
| [30] Phosphorus " | $P\ Cl_3$. | 1.45. l. | | |
| [31] " " | " | 1.61616, 0.° l. | 78°34. 751.5m.m | |
| [32] " " | " | l. | 78.° 763 m. m. | |
| [33] " " | " | l. | 78°5. 760 m. m. | |

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[33] Andrews See 17, or 29.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Phosphorus trichloride. | $P Cl_3$. | l. | 73° 8. 760 m. m. | |
| [2] | " " | " | 1.6119,0.° m. of 2. | 76.° 760m. m. | |
| [3] | " " | " | 1.59708, 10.° | | |
| [4] | " " | " | 1.47124, 76.°m. of 3. | | |
| [5] | " " | " | 1.5774, 20.° | 76.° 745.9 m. m. | |
| [6] | " pentachloride. | $P Cl_5$. | | 148.° | |
| [7] | Vanadium dichloride. | $V Cl_2$. | 3.23, 18.° s. | | |
| [8] | " trichloride. | $V Cl_3$. | 3.00, 18.° s. | | |
| [9] | " tetrachloride | $V Cl_4$. | l. 1.8584, 0.° | 154.° 760 m. m. | |
| [10] | " " | " | l. 1.8363, 8.° | | |
| [11] | " " | " | l. 1.8159, 32°. | | |
| [12] | Arsenic trichloride. | $As Cl_3$. | | 132.° | |
| [13] | " " | " l. | 2.20495, 0.° | 133°81. 756.9 [m. m. | |
| [14] | " " | " l. | 2.1766. | | |
| [15] | " " | " l. | 2.1668, 20.° | 128.° 754 m. m. | |
| [16] | Antimony " | $Sb Cl_3$. | | 198.° | |
| [17] | " " | " | | 230.° | 72.° |
| [18] | " " | " l. | 2.675, 73.° 2. | 223.° 760 m. m. | 73°2. |
| [19] | " pentachloride. | $Sb Cl_5$. | 2.3461. 20.° | | |
| [20] | Bismuth trichloride. | $Bi Cl_3$. | 4.56, 11.° | | |
| [21] | Carbon dichloride. | $C_2 Cl_4$. | 1.619, 20.° | 122.° | |
| [22] | " " | " | 1.649, 0.° | 123.9. 761.9 m.m | |
| [23] | " " | " | 1.612, 10.° | 116°7. | |
| [24] | " trichloride. | $C_2 Cl_6$. | 2.0. | 182.° | 160. |
| [25] | " tetrachloride. | $C Cl_4$. | 1.599. | 78.° | |
| [26] | " " | " | 1.56. | 77.° | |
| [27] | " " | " | 1.62983, 0.° | 78°1. 748.3 m.m | |
| [28] | " " | " | 1.567, 12.° | 77.° | |
| [29] | " " | " | 1.5947, 20.° | 75°5. 739.4 m.m | |
| [30] | Silicon trichloride. | $Si_2 Cl_6$. | 1.58, 0.° | 146.°–148.° | |
| [31] | " tetrachloride. | $Si Cl_4$. | | 50.° | |
| [32] | " " | " | 1.52371, 0.° | 59.° 760 m. m. | |
| [33] | " " | " | 1.4878, 20.° | 58.° 756 m. m. | |

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[31] Serullas. See 17.
[32] Pierre. 15, or 45.
[33] Haagen. 32.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Silicon tetrachloride. | $Si\ Cl_4$. | 1.4928, 15.° | | |
| [2] " " | " | 1.49276. | | |
| [3] " " | " | 1.50068, 10.° 98. | | |
| [4] " " | " | 1.522, 0.° | | |
| [5] Titanium " | $Ti\ Cl_4$. | 1.76088, 0.° | 136.° 762.3 m.m | |
| [6] " " | " | | 135.° | |
| [7] Tin protochloride. | $Sn\ Cl_2$. | | | 250.° |
| [8] " tetrachloride. | $Sn\ Cl_4$. | 2.26712, 0.° | 115°4. 753.1 m.m | |
| [9] " " | " | | 120.° 767 m.m. | |
| [10] " " | " | | 112°5. 752 m.m. | |
| [11] " " | " | 2.234, 15.° | | |
| [12] " " | " | 2.2328, 20.° | 162.° 754.9 m.m | |
| [13] Aluminic chloride. | $Al_2\ Cl_6$. | | | 180.° |
| [14] Niobic " | $Nb\ Cl_5$. | | 240°5. | 194.° |
| [15] Tantalic " | $Ta\ Cl_5$. | | 241°6. 753 m.m. | 211.° 3. |
| [16] Tungsten pentachloride. | $W\ Cl_5$. | | 275°6. | 248.°8.242.° |
| [17] " hexchloride. | $W\ Cl_6$. | | 346°7. | 275.°8.270.° |

## 2d. HYDRATED SIMPLE CHLORIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [18] Calcium chloride. | $Ca\ Cl_2.\ 6\ H_2O$. | 1.680. m. of 2. | | |
| [19] " " | " | 1.635. | | |
| [20] " " | " | 1.612, 10.° | | 29.° |
| [21] Strontium " | $Sr\ Cl_2.\ 6\ H_2O$. | 2.015. m. of 2. | | |
| [22] " " | " | 1.603. | | |
| [23] " " | " | 1.921. | | |
| [24] Barium " | $Ba\ Cl_2.\ 2\ H_2O$. | 3.144. m. of 2. | | |
| [25] " " | " | 2.664. | | |
| [26] " " | " | 3.05435, 4.° | | |
| [27] " " | " | 3.052. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Barium chloride. | $Ba\,Cl_2.\,2\,H_2\,O$ | 3.081. | | |
| [2] Manganous chloride. | $Mn\,Cl_2.\,4\,H_2\,O.$ | | 106.° | 87°5. |
| [3] Manganous chloride. | $Mn\,Cl_2.\,4\,H_2\,O.$ | 2.01, 10.° | | |
| [4] Ferrous " | $Fe\,Cl_2.\,4\,H_2\,O.$ | 1.926. | | |
| [5] " " | " | 1.937. | | |
| [6] Cobaltous " | $Co\,Cl_2.\,6\,H_2\,O.$ | 1.84. 13.° | | |
| [7] Cupric " | $Cu\,Cl_2.\,2\,H_2\,O.$ | 2.535. m.of 2. | | |
| [8] " " | " | 2.47, 18.° | | |
| [9] Magnesium " | $Mg\,Cl_2.\,6\,H_2\,O.$ | 1.562. m.of 4. | | |
| [10] " " | " | 1.558. | | |
| [11] Stannous " | $Sn\,Cl_2.\,2\,H_2\,O.$ | 2.759. s. | | |
| [12] " " | " | 2.71. 15°5. s. | | |
| [13] " " | " | 2.5876, 37°7.1 | | |
| [14] " " | $Sn\,Cl_2.\,4\,H_2\,O.$ | | | 50.° |
| [15] Platinic " | $Pt\,Cl_4.\,8\,H_2\,O.$ | 2.431, 15.° | | |

## 3d. ANHYDROUS DOUBLE CHLORIDES.

**Excluding Compounds of Oxychlorides.**

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [16] Potassium zinc chloride. | $2\,K\,Cl.\,Zn\,Cl_2.$ | 2.297. | | |
| [17] Ammonium zinc chloride. | $2\,N\,H_4\,Cl.\,Zn\,Cl_2.$ | 1.879. | | |
| [18] " " " | " | 1.72–1.77, 10° | | |
| [19] Potassium platinchloride. | $2\,K\,Cl.\,Pt\,Cl_4.$ | 3.586, 15.° | | |
| [20] " " | " | 3.694. | | |
| [21] Ammonium " | $2\,N\,H_4\,Cl.\,Pt\,Cl_4.$ | 2.955. | | |
| [22] " " | " | 3.009. } 15.° | | |
| [23] " " | " | 2.960. | | |
| [24] Potassium iridochloride. | $2\,K\,Cl.\,Ir\,Cl_4.$ | 3.546, 15.° | | |
| [25] Ammonium " | $2\,N\,H_4\,Cl.\,Ir\,Cl_4.$ | 2.856, 15.° | | |
| [26] Caesium stannochloride. | $2\,Cs\,Cl.\,Sn\,Cl_4.$ | 3.3308, 20.° 5. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium aluminum chloride. | $2\,Na\,Cl.\,Al_2\,Cl_6$. | | | 185.° |
| [2] Selenium phosphorus " | $Se\,Cl_4.\,2\,P\,Cl_5$. | | 220.° | |
| [3] Iron " " | $Fe_2\,Cl_6.\,2\,P\,Cl_5$. | | 280°+. | 98.° |
| [4] Aluminum " " | $Al_2\,Cl_6.\,2\,P\,Cl_5$. | | 400.° | |
| [5] Silicohydric " | $Si_3\,H_4\,Cl_{10}$. | 1.65. | 42.° | |

## 4th. HYDRATED DOUBLE CHLORIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [6] Potassium iron chloride. | $2\,K\,Cl.\,Fe\,Cl_2.\,2\,H_2\,O$. | 2.162. | | |
| [7] " copper " | $2\,K\,Cl.\,Cu\,Cl_2.\,2\,H_2\,O$. | 2.426. | | |
| [8] " " " | " | 2.400. | | |
| [9] " " " | " | 2.359. | | |
| [10] " " " | " | 2.410. | | |
| [11] Ammonium " " | $2\,N\,H_4\,Cl.\,Cu\,Cl_2.\,2\,H_2\,O$. | 2.018. | | |
| [12] " " " | " | 1.963. | | |
| [13] " " " | " | 1.977. | | |
| [14] " " " | " | 2.066. | | |
| [15] " magnesium " | $N\,H_4\,Cl.\,Mg\,Cl_2.\,6\,H_2\,O$. | 1.456, 10.° | | |
| [16] Sodium mercury " | $Na\,Cl.\,Hg\,Cl_2.\,2\,H_2\,O$. | 3.011. | | |
| [17] Potassium " " | $K\,Cl.\,Hg\,Cl_2.\,H_2\,O$. | 3.735.m.of3. | | |
| [18] Ammonium " " | $2\,N\,H_4\,Cl.\,2\,Hg\,Cl_2.\,H_2O$. | 3.822. | | |
| [19] " " " | $2\,N\,H_4\,Cl.\,Hg\,Cl_2.\,H_2\,O$. | 2.938. | | |
| [20] Potassium tin " | $2\,K\,Cl.\,Sn\,Cl_2\,3\,H_2\,O$. | 2.514. | | |
| [21] Ammonium tin " | $2\,N\,H_4\,Cl.\,Sn\,Cl_2.\,3\,H_2\,O$. | 2.104. | | |

## 5th. OXY- AND SULPHO-CHLORIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [22] Thionyl chloride. | $S\,O\,Cl_2$. | | 82.° | |
| [23] " " | " | 1.675, 0.° | 78.° | |
| [24] Chlorosulphuric acid. | $S_2\,O_5\,Cl_2$. | 1.818, 16.° | 145.° | |
| [25] " " | " | 1.762. | 145°–150.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Selenyl chloride. | Se O $Cl_2$. | 2.44. | 220.° [m.m. | |
| [2] " " | " | 2.443, 13.° | 179°5. 760. | 10.° rs, 0.° |
| [3] Chlorochromic acid. | Cr $O_2$ $Cl_2$. | 1.9134, 10.° | [m.m. | |
| [4] " " | " | 1.71, 21.° | 118° 760 | |
| [5] " " | " | 1.92, 25.° | 116°8. 733 | |
| [6] Tungsten oxychloride. | W O $Cl_4$ | | 227°5. [m.m. | 210°4. s. 206°7. |
| [For native mineral oxychlorides. See Table of Miscellaneous Compounds.] | | | | |
| [7] Nitrosyl chloride. | N $O_2$ Cl. | 1.32, 14.° | | |
| [8] Phosphorus oxychloride | P O $Cl_3$. | 1.673, 14.° | 110.° | |
| [9] " " | " | 1.70, 12.° | 110.° | |
| [10] " " | " | 1.662, 19.°5. [of 2. | | |
| [11] " " | " | 1.69371, 10.° m. | | |
| [12] " " | " | 1.69106, 14.° | | |
| [13] " " | " | 1.68626, 15.° | 110.° | |
| [14] " " | " | 1.64945, 51.° | 760 m.m | |
| [15] " " | " | 1.509116, 110.° | | |
| [16] " " | " | 1.66. [m. of 5. | 110.° | |
| [17] Vanadyl dichloride. s. | V O $Cl_2$. | 2.88. 13.° s. | | |
| [18] " trichloride. | V O $Cl_3$. | 1.764, 20.° | 127.° | |
| [19] " " | " | 1.841, 14.° 5. | | |
| [20] " " | " | 1.836, 17.° 5. | 126.° 7. | |
| [21] " " | " | 1.828, 24.° | 760 m. m. | |
| [22] Carbon oxychloride. | C O $Cl_2$. | 1.432, 0.° ! | 8°2. | |
| [23] " " | " | 1.392, 18.° 6. | 756.4 m.m. | |
| [24] Silicon " | $Si_2$ O $Cl_6$. | | 136°–139.° | |
| [25] Phosphorus sulphochloride. | P S $Cl_3$. | | 126°–127.° | |
| [26] " " | " | | 126°–127.° | |
| [27] " " | " | 1.631, 22.° | 124°–125.° | |
| [28] Carbon " | C S $Cl_2$. | 1.46. | 70.° | |
| [29] Silicon " | $Si_3S_2Cl_8$(?) | 1.45, 15.° | a. 100.° | |

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### 6th. AMMONIO-CHLORIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Pupureo cobalt chloride. | $10\,N\,H_3.\,Co_2\,Cl_6$. | 1.802, 23.° | | |
| [2] Luteo cobalt « | $12\,N\,H_3.\,Co_2\,Cl_6$. | 1.7016, 20.° | | |
| [3] Copper ammonio « 1st. | $Cu\,Cl_2.\,2\,N\,H_3$. | 2.194. | | |
| [4] « « « 2d. | $Cu\,Cl_2.\,4\,N\,H_3.\,H_2\,O$. | 1.672. | | |
| [5] Mercury « « | $Hg\,Cl_2.\,N\,H_3$. | | 590.° | |
| [6] Dimercurosammonium chloride. | $(Hg_2\,N\,H_2)\,Cl$. | 6.858. m.of 2 | | |
| [7] Dimercurammonium chloride. | $Hg_2\,N_2\,H_4\,Cl_2$. | 5.700. | | |
| [8] (?) | $Hg_4\,N_2\,Cl_2.\,2\,H_2\,O$. | 7.176. m.of 2 | | |

## IV. Inorganic Bromides.

### 1st. SIMPLE BROMIDES. ANHYDROUS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [9] Hydrogen bromide. | H Br. | | | s.—87.° |
| [10] Sodium « | Na Br. | 2.952. | | |
| [11] « « | « | 3.079, 17.° 5. | | |
| [12] « « | « | 3.011. | | |
| [13] Potassium « | K Br. | 2.415. | | |
| [14] « « | « | 2.672. | | |
| [15] « « | « | 2.690. m. of 6. | | |
| [16] Ammonium « | $N\,H_4\,Br$. | 2.379. | | |
| [17] « « | « | 2.266. 10.° | | |
| [18] Silver « | Ag Br. | 6.3534. | | |
| [19] « « | « | 6.425. m. of 7. | | |
| [20] « « | « | 5.8–6.02, Native. | | |
| [21] Selenium « | Se Br. | 3.604, 15.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Calcium bromide. | $Ca\ Br_2$. | 3.32, 11. | | |
| [2] Strontium " | $Sr\ Br_2$. | 3.962. 12.° | | |
| [3] Barium " | $Ba\ Br_2$. | 4.23. | | |
| [4] Lead " | $Pb\ Br_2$. | 6.6302. | | |
| [5] " " | " | 6.611, 17°5. | | |
| [6] Cuprous " | Cu Br. | 4.72, 12.° | | |
| [7] Zinc " | $Zn\ Br_2$. | 3.643, 10.° | | |
| [8] Cadmium " | $Cd\ Br_2$. | 4.712. } 14.° | | |
| [9] " " | " | 4.910. } | | |
| [10] Mercurous " | Hg Br. | 7.307. | | |
| [11] Mercuric " | $Hg\ Br_2$. | 5.9202. | | |
| [12] " " | " | | | 222°–223.° |
| [13] Boron tribromide. | $B\ Br_3$. | 2.69. l. | 90°5. | |
| [14] Phosphorus " | $P\ Br_3$. | 2.92489, 0.° l. | 175°3. 760.2m.m. | |
| [15] " " | " | | 167.° | |
| [16] Arsenic " | $As\ Br_3$. | | 220.° | 20°–25.° |
| [17] " " | " | 3.66, 15.° | | |
| [18] Antimony " | $Sb\ Br_3$. | | 270.° | 94.° |
| [19] " " | " | 3.641, 90.° l. | 275°4. 760 m. m. | 90.° |
| [20] Bismuth " | $Bi\ Br_3$. | | | 200.° |
| [21] " " | " | 5.6041. | | |
| [22] Carbon dibromide. | $C_2\ Br_4$. | | | 50.° |
| [23] Carbon tetrabromide. | $C\ Br_4$. | | | 91.° |
| [24] Silicon " | $Si\ Br_4$. | l. 2.8128, 0.° | 153°36. 762.3m.m. | |
| [25] " " | " | | 148°–150.° | s–12°to–15.° |
| [26] Titanium " | $Ti\ Br_4$. | 2.6. | 230.° | 39.° |
| [27] Tin " | $Sn\ Br_4$. | 3.322, 39.° l. | | |
| [28] Aluminium bromide. | $Al_2\ Br_6$. | | 265°–270.° | 90.° |
| [29] " " | " | 2.54. | 260.° | 93.° |

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## 2d. HYDRATED, DOUBLE, OXY-, AND SULPHO-BROMIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium bromide. | $Na\ Br.\ 4\ H_2\ O.$ | 2.34. | | |
| [2] Barium " | $Ba\ Br_2.\ 3\ H_2\ O.$ | 3.690. | | |
| [3] Ammonium zinc bromide. | $2\ N\ H_4\ Br.\ Zn\ Br_2.$ | 2.625, 13.° | | |
| [4] Potassium platin—bromide. | $2\ K\ Br.\ Pt\ Br_3.$ | 4.68, 14.° | | |
| [5] Silicohydric bromide. | $Si_3\ H_4\ Br_{10}.$ | a. 2.5. | | |
| [6] Phosphorus oxybromide. | $P\ O\ Br_3.$ | 2.822. s. or l.(?) | 195.° | 45°–46.° |
| [7] " " | " | | 193.° | 55.° |
| [8] Vanadyl bromide. | $V\ O\ Br_3.$ | 2.9673, 0.° } l. | 130°–136.° | |
| [9] " " | " | 2.9325, 14.°5 } | | |
| [10] Phosphorus sulphobromide. | $P\ S\ Br_3.$ | 2.72. | 215.° | 39.° |
| [11] " " | " | 2.85, 17.° | | |
| [12] " " | $P\ S\ Br_3.\ H_2\ O.$ | 2.7937, 18.° | | 35.° |

# V. Inorganic Iodides.

## 1st. SIMPLE ANHYDROUS IODIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Hydrogen iodide. | H I. | | | s.—51.° |
| [14] Sodium " | Na I. | 3.450. | | |
| [15] Potassium " | K I. | 3.078–3.104. | | |
| [16] " " | " | 2.9084. | | |
| [17] " " | " | 3.059. | | |
| [18] " " | " | 3.056. | | |
| [19] " " | " | 2.850. | | |
| [20] " " | " | 2.970. | | |

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[19] Schiff. 21.
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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Potassium iodide. | K I. | 3.081–3.077. | | |
| [2] Ammonium " | $N H_4$ I. | 2.498, 11.° | | |
| [3] Silver " | Ag I. | 5.64–5.67. | | |
| [4] " " | " | 5.504. | | |
| [5] " " | " | 5.707. Iodyrite. | | |
| [6] " " | " | 5.614. | | |
| [7] " " | " | 5.0262. | | |
| [8] " " | " | 5.500. | | |
| [9] " " | " | 5.366. Native. | | |
| [10] " " | " | 5.35. | | |
| [11] " " | " | 5.650. | | |
| [12] " " | " | 5.718. | | |
| [13] " " | " | 5.47. 0.° | | |
| [14] " " | " | 5.544. Cryst. | | |
| [15] " " | " | 5.687. After fusion. | | |
| [16] " " | " | 5.807. 0.° Precip. | | |
| [17] Strontium " | $Sr I_2$. | 4.415, 10.° | | |
| [18] Barium " | $Ba I_2$. | 4.917. | | |
| [19] Lead " | $Pb I_2$. | 6.11. | | |
| [20] " " | " | 6.0212. | | |
| [21] " " | " | 6.384. | | |
| [22] " " | " | 6.07. | | |
| [23] " " | " | 6.207. | | |
| [24] Cuprous iodide. | Cu I. | 4.410. | | |
| [25] Zinc " | $Zn I_2$. | 4.696, 10.° | | |
| [26] Cadmium " | $Cd I_2$. | 4.576, 10.° | | |
| [27] Mercurous " | Hg I. | 7.75. | | |
| [28] " " | " | 7.6445. | | |
| [29] Mercuric " | $Hg I_2$. | 6.32. | | |
| [30] " " | " | 6.2009. | | |
| [31] " " | " | 6.250. | | |
| [32] " " | " | 5.91. | | |
| [33] " " | " | 6.27. | | |

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[30] Karsten. 3.
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[32] Schiff. 21.
[33] Tschermak. 27.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Mercuic iodide. | $Hg\ I_2$. | | | 238.° |
| [2] Phosphorus diiodide. | $P\ I_2$. | | | a 110.° |
| [3] " tri iodide. | $P\ I_3$. | | | 55.° |
| [4] Arsenic " | $As\ I_3$. | 4.39, 13.° | | |
| [5] Antimony " | $Sb\ I_3$. | 5.01, 10.° | | |
| [6] Bismuth " | $Bi\ I_3$. | 5.652, 10.° | | |
| [7] Silicon tetriodide. | $Si\ I_4$. | | 290.° | 120. 5. |
| [8] Titanium " | $Ti\ I_4$. | | 360.°+ | 150.° |
| [9] Tin " | $Sn\ I_4$. | | 295.° | 146.° s. 142.° |
| [10] " " | " | 4.696, 11.° | | |
| [11] Aluminum iodide. | $Al_2\ I_6$. | | | a. 185.° |
| [12] " " | " | 2.63. | 350.° | 125.° |

## 2d. HYDRATED AND DOUBLE IODIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Ferrous iodide. | $Fe\ I_2 . 4\ H_2\ O$. | 2.873, 12.° | | |
| [14] Potassium platiniodide. | $2\ K\ I . Pt\ I_4$. | 5.154. } 12.° | | |
| [15] " " | " | 5.198. } | | |

## VI. Chlorobromides, Chlorides, and Bromides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [16] Carbon chlorobromide. | $C_2\ Cl_4\ Br_2$. | 2.3, 21.° | | |
| [17] Silicon " | $Si\ Cl_3\ Br$. | | 80.° | |
| [18] Phosphorus oxychlorobromide. | $P\ O\ Cl_2\ Br$. | 2.059, 0.° | 135.°–137.° | |
| [19] Mercury bromiodide. | $Hg\ I\ Br$. | | | 229.° |

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## VII. Oxides.

### 1st. SIMPLE OXIDES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Water.* | $H_2O$. | 1.000, 4.° | 100.° | 0.° |
| [2] | " | " | .999889, +, 0.° | | |
| [3] | " | " | .988433+, 50.° | | |
| [4] | " | " | .958737+, 100.° | | |
| [5] | " | " | .999887, 0.° | | |
| [6] | " | " | .992247, 40.° | | |
| [7] | " | " | .999862, 0.° | | |
| [8] | " | " | .99988, 0.° | | |
| [9] | " | " | .95903, 99°.8. | | |
| [10] | " | " | .93078, 130°.8. | | |
| [11] | " | " | .93123, 131.° | | |
| [12] | " | " | .93035, 131°.1. | | |
| [13] | " | " | .90811, 156°.7. | | |
| [14] | " | " | .90783, | | |
| [15] | " | " | .90715, 157.° | | |
| [16] | " | " | .95892, 100.° | | |
| [17] | " | " | .999866, 0.° | | |
| [18] | " | " | .98835, 50.° | | |
| [19] | Ice.* | " | .91812, —1.° | | |
| [20] | " | " | .91912, —10.° | | |
| [21] | " | " | .92025, —20.° | | |
| [22] | " | " | .9184, m. of 2. | | |
| [23] | " | " | See 11. | | |
| [24] | " | " | | | |
| [25] | " | " | .9175. m. of 22. | | |
| [26] | " | " | .918. | | |
| [27] | " | " | .922. | | |

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*In dealing with water and ice the compiler has not sought for completeness. Only the more prominent of a vast number of determinations are here given.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Hydrogen peroxide. | $H_2O_2$. | 1.452. | | |
| [2] | Chlorine trioxide. l. | $Cl_2O_3$. | 1.3298. } 0.° | 8° to 9.° | |
| [3] | " " l. | " | 1.387. } | 745 m. m. | |
| [4] | Iodine pentoxide. | $I_2O_5$. | 4.250. | | |
| [5] | " " | " | 4.7987, 9.° | | |
| [6] | " " | " | 4.487, 0.° | | |
| [7] | Sodium oxide. | $Na_2O$. | 2.805. | | |
| [8] | Potassium oxide. | $K_2O$. | 2.656. | | |
| [9] | Silver " | $Ag_2O$. | 7.143, 16°6. | | |
| [10] | " " | " | 7.250. | | |
| [11] | " " | " | 8.2558. | | |
| [12] | " " | " | 7.147. | | |
| [13] | " peroxide. | $Ag_2O_2$. | 5.474. Impure. | | |
| [14] | Sulphurous acid. l. | $SO_2$. | 1.42. | —10.° | |
| [15] | " " l. | " | 1.45. | | |
| [16] | " " l. | " | | —10°5. | |
| [17] | " " l. | " | | | s—76.° |
| [18] | " " l. | " | 1.4911, —20°5. | —8°759.2m.m. | |
| [19] | " " | " | 1.4609, —9°9. | | |
| [20] | " " | " | 1.4384, —2°08. | | |
| [21] | " " | " | 1.4318, —0°25. | | |
| [22] | " " | " | 1.4252, +2°8. | | |
| [23] | " " | " | 1.4205, 4°51. | | |
| [24] | " " | " | 1.4102, 8°27. | | |
| [25] | " " | " | 1.4017, 11°5. | | |
| [26] | " " l. | " | 1.3887, 16°43. | | |
| [27] | " " | " | 1.3769, 20°63. | | |
| [28] | " " | " | 1.3673, 23°91. | | |
| [29] | " " | " | 1.3587, 26°9. | | |
| [30] | " " | " | 1.3513, 29°57. | | |
| [31] | " " | " | 1.3415, 32°96. | | |
| [32] | " " | " | 1.3350, 35°29. | | |
| [33] | " " | " | 1.3258, 38°65. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Sulphuric acid. | $S O_3$. | 1.9546, 13.° s. | | |
| [2] | " " | " | 1.975. s. | | |
| [3] | " " | " | 1.97, 20.° l. | | a 25.° |
| [4] | " " | " | 1.92118. | | |
| [5] | " " | " | 1.90915. 25.° | | |
| [6] | " " | " | 1.90814. s. | 46°–47.° | 29°5. |
| [7] | " " | " | 1.81958. | 760 m. m. | rs. 25° |
| [8] | " " | " | 1.8105. 47.° | | |
| [9] | " " | " | 1.8101. l. | | |
| [10] | " " | " | | 46.° | |
| [11] | Tellurium dioxide. | $Te O_2$. | 5.93, 20.° | | |
| [12] | Calcium oxide. | Ca O. | 3.179. | | |
| [13] | " " | " | 3.16105. | | |
| [14] | " " | " | 3.180. | | |
| [15] | Strontium oxide. | Sr O. | 3.9321. | | |
| [16] | " " | " | 4.611. | | |
| [17] | Barium " | Ba O. | 4.0. | | |
| [18] | " " | " | 4.7322. | | |
| [19] | " " | " | 4.829—4.986. | | |
| [20] | " " | " | 5.456. | | |
| [21] | " peroxide. | $Ba O_2$. | 4.958. | | |
| [22] | Lead suboxide. | $Pb_2 O$. | 9.772. | | |
| [23] | " monoxide. | Pb O. | 9.277. 17°5. | | |
| [24] | " " | " | 9.5. | | |
| [25] | " " | " | 9.2092. | | |
| [26] | " " | " | 9.250. | | |
| [27] | " " | " | 9.361. | | |
| [28] | " " | " | 9.3634, 4.° | | |
| [29] | " " | " | 8.02. Cryst. | | |
| [30] | " " | " | 9.2–9.36. Native. | | |
| [31] | " dioxide. | $Pb O_2$. | 8.902. 16°5. | | |
| [32] | " " | " | 8.933. | | |
| [33] | " " | " | 8.897–8.756. | | |
| [34] | " Minium. | $Pb_3 O_4$. | 8.94. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Minium. | $Pb_3 O_4$. | 9.096. 15.° | | |
| [2] | " | " | 9.190. | | |
| [3] | " | " | 8.62. | | |
| | [The oxides of the iron and allied groups are arranged according to similarity of formula.] | | | | |
| [4] | Manganous oxide. | Mn O. | 4.7264. 17.° | | |
| [5] | " " | " | 5.38. | | |
| [6] | " " | " | 5.091. | | |
| [7] | Nickelous " | Ni O. | 5.597. | | |
| [8] | " " | " | 5.745. Furnace product. | | |
| [9] | " " | " | 6.605. Cryst. | | |
| [10] | " " | " | 6.398. | | |
| [11] | " " | " | 6.661. | | |
| [12] | " " | " | 6.8. Artif. cryst. | | |
| [13] | " " | " | 6.398. Bunsenite. | | |
| [14] | Cobaltous " | Co O. | 5.597. | | |
| [15] | " " | " | 5.75. After ignition. | | |
| [16] | Uranous " | U O. | 10.15. | | |
| [17] | Cupric " | Cu O. | 6.401. 16°5. | | |
| [18] | " " | " | 6.130. | | |
| [19] | " " | " | 6.4304. | | |
| [20] | " " | " | 5.90. | | |
| [21] | " " | " | 6.414. After ignition. | | |
| [22] | " " | " | 6.322. | | |
| [23] | " " | " | 6.451. Cryst. furnace product. | | |
| [24] | " " | " | 6.25. Melaconite. | | |
| [25] | " " | " | 5.952. " | | |
| [26] | Sesquioxides. | $R_2 O_3$. | | | |
| [27] | Chromic oxide. | $Cr_2 O_3$. | 5.21. Cryst. | | |
| [28] | " " | " | 4.909. | | |
| [29] | " " | " | 6.2. Cryst. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Chromic oxide. | $Cr_2 O_3$. | 5.010. | | |
| [2] Manganic " | $Mn_2 O_3$. | 4.82. Braunite. | | |
| [3] " " | " | 4.619. } Artificial. | | |
| [4] " " | " | 4.568. } | | |
| [5] " " | " | 4.325. Artificial. } | | |
| [6] " " | " | 4.752. Braunite. } | | |
| [7] Ferric " | $Fe_2 O_3$. | 5.251. | | |
| [8] " " | " | 5.261. Natural. | | |
| [9] " " | " | 5.121, 12°.5. Natural. | | |
| [10] " " | " | 4.959, 16°.5. Precip. | | |
| [11] " " | " | 5.225. | | |
| [12] " " | " | 4.679. } | | |
| [13] " " | " | 5.135. Ignited. } | | |
| [14] " " | " | 5.241. } Native. | | |
| [15] " " | " | 5.283. } | | |
| [16] " " | " | 5.191. } Native. | | |
| [17] " " | " | 5.214. } From three | | |
| [18] " " | " | 5.230. } localities. | | |
| [19] " " | " | 5.169. Precip. } | | |
| [20] " " | " | 5.037. Ignited. } | | |
| [21] Nickelic " | $Ni_2 O_3$. | 4.814. | | |
| [22] " " | " | 4.846, 16°.5. | | |
| [23] Cobaltic " | $Co_2 O_3$. | 5.322, 16°.5. | | |
| [24] " " | " | 5.60. | | |
| [25] " " | " | 4.814. | | |
| [26] Aluminic " | $Al_2 O_3$. | 4.152, 4.° | | |
| [27] " " | " | 3.944. | | |
| [28] " " | " | 4.004. | | |
| [29] " " | " | 3.531. Ruby. | | |
| [30] " " | " | 3.562. Sapphire. | | |
| [31] " " | " | 4.154. | | |
| [32] " " | " | 3.928. Artif. cryst. | | |
| [33] " " | " | 4.022. Corundum. } | | |
| [34] " " | " | 3.992. Above, after fusion. } | | |

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[15] Rammelsberg. }
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[31] Filhol. 12.
[32] Ebelmen. 4.14.
[33] Ch. St. C. Deville. See 23.
[34] Ch. St. C. Deville. See 23.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Aluminic oxide. | $Al_2 O_3$. | 3.870. | | |
| [2] | " " | " | 3.899. Artificial. | | |
| [3] | " " | " | 3.750. | | |
| [4] | " " | " | 3.725. Heated in a wind furnace. | | |
| [5] | " " | " | 3.999. Ign. in porcelain furnace. | | |
| [6] | " " | " | 3.899, 15°5. | | |
| [7] | " " | " | 3.929. Corundum. | | |
| [8] | " " | " | 3.974. | | |
| [9] | " " | " | 3.9998. | | |
| [10] | " " | " | 4.0001. Sapphire. | | |
| [11] | " " | " | 3.994. Ruby. m. of 9. | | |
| [12] | " " | " | 4.0067, 14° Powdered. | | |
| [13] | " " | " | 3.989. 13°5. | | |
| [14] | " " | " | 4.008. Powder after ignition. | | |
| [15] | Three to four oxides. | $R_3 O_4$. | | | |
| [16] | Mangano-manganic oxide. | $Mn_3 O_4$. | 4.722. Hausmannite. | | |
| [17] | " " | " | 4.746. | | |
| [18] | " " | " | 4.653. Artif. | | |
| [19] | " " | " | 4.325. Artificial. | | |
| [20] | " " | " | 4.718. Artificial. | | |
| [21] | " " | " | 4.856. Native. | | |
| [22] | Ferroso-ferric oxide. | $Fe_3 O_4$. | 5.094. | | |
| [23] | " " | " | 4.960. | | |
| [24] | " " | " | 4.900—5.200. | | |
| [25] | " " | " | 5.300, 16°5. | | |
| [26] | " " | " | 5.400. | | |
| [27] | " " | " | 5.480. | | |
| [28] | " " | " | 5.168. Cryst. | | |
| [29] | " " | " | 5.180. Magnetite. | | |
| [30] | " " | " | 5.453. | | |
| [31] | " " | " | 5.12, 0.° Native. | | |
| [32] | " " | " | 5.185. Native. | | |
| [33] | " " | " | 5.148. From three localities. | | |
| [34] | " " | " | 5.106. | | |

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[17] Playfair and Joule. 11.
[18] Playfair and Joule. 11.
[19] Playfair and Joule. 14.
[20] Rammelsberg. 18.878.
[21] Rammelsberg. 18.878.
[22] Mohs.
[23] Gerolt.
See 11.
[24] Leonhard. See 11.
[25] Herapath. 1.
[26] Boullay. 2.
[27] Boullay. 2.
[28] Kenngott; see Dana's Mineralogy.
[29] Kenngott; see Dana's Mineralogy.
[30] Playfair and Joule. 11.
[31] Kopp. See 23.
[32] Rammelsberg. See 23.
[33] Rammelsberg. See 23.
[34] Rammelsberg. See 23.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Cobaltoso-cobaltic oxide. | $Co_3 O_4$. | 5.833. | | |
| [2] | " " " | " | 6.296. | | |
| [3] | Uranoso-uranic " | $U_3 O_4$. | 7.1932. | | |
| [4] | " " " | " | 7.31. | | |
| [5] | Trioxides. | $R O_3$. | | | |
| [6] | Chromium trioxide. | $Cr O_3$. | 2.676. m. of 2. | | |
| [7] | " " | " | 2.737, 14.° Cryst. | | |
| [8] | " " | " | 2.629, 14.° After fusion. | | |
| [9] | " " | " | 2.819, 20.° | | |
| [10] | Molybdenum " | $Mo O_3$. | 3.46. | | |
| [11] | " " | " | 3.49. | | |
| [12] | " " | " | 4.49—4.50. Native. | | |
| [13] | " " | " | 4.39. 21.° m.of 2 Cryst. | | |
| [14] | Tungsten " | $W O_3$. | 6.12. | | |
| [15] | " " | " | 5.274, 16°5. | | |
| [16] | " " | " | 7.1396. | | |
| [17] | " " | " | 6.302. | | |
| [18] | " | " | 6.384. Cryst. | | |
| [19] | " " | " | 7.16. Amorphous. | | |
| [20] | " " | " | 7.232, 17.° Cryst. | | |
| | [Miscellaneous oxides of the Fe. Pt. Mo. Zn. groups.] | | | | |
| [21] | Manganese dioxide. | $Mn O_2$ | 4.81. Pyrolusite. | | |
| [22] | " " | " | 5.026. " | | |
| [23] | " " | " | 4.838. | | |
| [24] | " " | " | 4.880. Polianite. | | |
| [25] | " " | " | 4.826. Polianite. | | |
| [26] | Cuprous oxide. | $Cu_2 O$. | 5.75. | | |
| [27] | " " | " | 6.093. | | |
| [28] | " " | " | 6.052. 16°5. | | |
| [29] | " " | " | 5.751. | | |
| [30] | " " | " | 5.746. | | |
| [31] | " " | " | 5.992. Cuprite. | | |

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[10] [11] Thomson. Berzelius. See 11.
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[13] Schafarik. 28.
[14] De Luyart. See 11.
[15] Herapath. 1.
[16] Karsten. 3.
[17] [18] Nordenskiöld. 14.214.
[19] [20] Zettnow. 20.216.
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[27] [28] Herapath. 1.
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[30] Playfair and Joule. 11.
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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ruthenium dioxide. | $Ru O_2$. | 7.2. | | |
| [2] Ruthenium tetroxide. | $Ru O_4$. | | a. 100.° | 58.° |
| [3] Molybdenum dioxide. | $Mo O_2$. | 5.67. | | |
| [4] Tungsten « | $W O_2$. | 12.1109. | | |
| [5] Zinc oxide. | Zn O. | 5.432. | | |
| [6] « « | « | 5.600. | | |
| [7] « « | « | 5.7344. | | |
| [8] « « | « | 5.6067. | | |
| [9] « « | « | 5.6570. | | |
| [10] « « | « | 5.5298. Cryst. | | |
| [11] « « | « | 5.612. | | |
| [12] « « | « | 5.684. Zincite. | | |
| [13] Cadmium oxide. | Cd O. | 8.183. 16°5. | | |
| [14] « « | « | 6.9502. | | |
| [15] « « | « | 8.111. | | |
| [16] Magnesium oxide. | Mg O. | 3.674. Periclase. | | |
| [17] « « | « | 3.750. « | | |
| [18] « « | « | 3.200. | | |
| [19] « « | « | 3.644. | | |
| [20] « « | « | 3.650. | | |
| [21] « « | « | 3.636. Artif. cryst. | | |
| [22] Mercurous « | $Hg_2 O$. | 10.69. 16°5. | | |
| [23] « « | « | 8.9503. | | |
| [24] Mercuric « | Hg O. | 11.074. 17°5. | | |
| [25] « « | « | 11.085. 18°3. | | |
| [26] « « | « | 11.0. | | |
| [27] « « | « | 11.1909. | | |
| [28] « « | « | 11.29. | | |
| [29] « « | « | 11.344. | | |
| [30] « « | « | 11.136. | | |
| [Miscellaneous oxides of unclassified metals.] | | | | |
| [31] Glucinum oxide. | Gl O. | 2.967. | | |
| [32] « « | « | 3.02—3.06. Cryst. | | |

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[11] Filhol. 12.
[12] W. P. Blake. 13.752.
[13] Herapath. 1.
[14] Karsten. 3.
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[24] Herapath. 1.
[25] Herapath. 1.
[26] Boullay. 2.
[27] Karsten. 3.
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[30] Playfair and Joule. 14.
[31] Ekeberg. P. M. (1). 14.346.
[32] Ebelmen. 4.15.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Glucinum oxide. | Gl O. | 3.09—3.083. Powder. | | |
| [2] " " | " | 3.096, 12.° Precip. | | |
| [3] " " | " | 3.027, 10.° Ignited in porcelain furnace. | | |
| [4] " " | " | 3.021, 9.° Cryst. | | |
| [5] Yttrium " | Y O. | 4.842. | | |
| [6] Ceric " | $Ce_2 O_3$. | 5.6059. | | |
| [7] " " | " | 6.00. | | |
| [8] Ceroso-diceric oxide. | $Ce_5 O_7$. | 5.769. | | |
| [9] Ceroso-ceric oxide. | $Ce_3 O_4$. | 6.93—6.94. 15°5. | | |
| [10] " " " | " | 7.09, 14°5. Cryst. | | |
| [11] Lanthanum " | La O. | 5.94. | | |
| [12] " " | " | 5.296, 16.° + tr. $B_2 O_3$. | | |
| [13] Didymium " | Di O. | 6.64. | | |
| [14] " " | " | 5.825, 14.° + tr. $B_2 O_3$. | | |
| [15] Thorium " | Th O. | 9.402. | | |
| [16] " " | " | 9.21. | | |
| [17] " " | " | 9.077—9.200. | | |
| [Nitrogen group.] | | | | |
| [18] Nitrous oxide. l. | $N_2 O$. | .9756, —5.° | | |
| [19] " " l. | " | .9370, 0.° | | |
| [20] " " l. | " | .9177, +5.° | | |
| [21] " " l. | " | .8964, 10.° | | |
| [22] " " l. | " | .8704, 15.° | | |
| [23] " " l. | " | .8365, 20.° | | |
| [24] Hyponitric acid. l. | $N O_2$. | 1.451. | 28? 760 m.m | |
| [25] " " l. | " | 1.42. | 28.° | |
| [26] Nitrogen pentoxide. | $N_2 O_5$. | | 45°–50.° | 29°–30.° |
| [27] Boron trioxide. | $B_2 O_3$. | 175. | | |
| [28] " " | " | 1.803. | | |
| [29] " " | " | 1.83. | | |
| [30] Phosphorus pentoxide. | $P_2 O_5$. | 2.387. | | |
| [31] Vanadium oxide. | $V_2 O_2$. | 3.64, 20.° Supposed metal. | | |
| [32] " trioxide. | $V_2 O_3$. | 4.72, 16.° m. of 3. | | |

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[32] Schafarik. 28.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Vanadium pentoxide. | $V_2 O_5$. | 3.472. } 20.° | | |
| [2] | " " | " | 3.510. } | | |
| [3] | Arsenic trioxide. | $As_2 O_3$. | 3.698. | | |
| [4] | " " | " | 3.690–3.710. | | |
| [5] | " " | " | 3.695. Octahedral. } | | |
| [6] | " " | " | 3.7385. Amorphous. } | | |
| [7] | " " | " | 3.729, 17°.2. | | |
| [8] | " " | " | 3.7202. } | | |
| [9] | " " | " | 3.7026. } | | |
| [10] | " " | " | 3.884. | | |
| [11] | " " | " | 3.85. Native, prismatic. | | |
| [12] | " pentoxide. | $As_2 O_5$. | 3.7342. | | |
| [13] | " " | " | 4.023. } | | |
| [14] | " " | " | 3.985. } | | |
| [15] | " " | " | 4.250. | | |
| [16] | Antimony trioxide. | $Sb_2 O_3$. | 5.57. | | |
| [17] | " " | " | 5.778. | | |
| [18] | " " | " | 6.6952. | | |
| [19] | " " | " | 5.251. | | |
| [20] | " " | " | 5.11. Octahedral. } | | |
| [21] | " " | " | 3.72. Prismatic. } | | |
| [22] | Senarmontite. | " | 5.22–5.30. | | |
| [23] | Valentinite. | " | 5.566. Cryst. | | |
| [24] | Antimony tetroxide. | $Sb_2 O_4$. | 4.074. | | |
| [25] | " " | " | 4.084. Cervantite. | | |
| [26] | " pentoxide. | $Sb_2 O_5$. | 6.525. | | |
| [27] | " " | " | 3.779. | | |
| [28] | Bismuth trioxide. | $Bi_2 O_3$. | 6.7608, 16°.5. } | | |
| [29] | " " | " | 8.211, 18°.3. After ignition. } | | |
| [30] | " " | " | 8.45. | | |
| [31] | " " | " | 8.1735. | | |
| [32] | " " | " | 8.079. | | |

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[30] Le Royer and Dumas.
[31] Karsten. 3.
[32] Playfair and Joule. 11.

| | Name. | | | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|---|---|
| | [Carbon group.] | | | | | | |
| 1 | Carbon dioxide. | | l. | $CO_2$. | .9, —20.° | | |
| 2 | " | " | l. | " | .83. 0.° | | —73.° |
| 3 | " | " | l. | " | .6. +30.° | | |
| 4 | " | " | s. | " | | | -56°.5 to -58° |
| 5 | " | " | l. | " | .9952, —10.° | | |
| 6 | " | " | l. | " | .9710, — 5.° | | |
| 7 | " | " | l. | " | .9471, 0.° | | |
| 8 | " | " | l. | " | .9222, + 5.° | | |
| 9 | " | " | l. | " | .8948, 10.° | | |
| 10 | " | " | l. | " | .8635, 15.° | | |
| 11 | " | " | l. | " | .8267, 20.° | | |
| 12 | " | " | l. | " | .7831, 25.° | | |
| 13 | Silicon | " | Quartz. | $SiO_2$. | 2.653. Cryst. | | |
| 14 | " | " | " | " | 2.6354. } Extremes of eleven | | |
| 15 | " | " | " | " | 2.6541. } determinations. | | |
| 16 | " | " | " | " | 2.653, 13.° m. of 5. | | |
| 17 | " | " | " | " | 2.653, 13.° Pulv. sandstone. | | |
| 18 | " | " | " | " | 2.656. Cryst. | | |
| 19 | " | " | " | " | 2.22. After fusion. | | |
| 20 | " | " Artificial. | | " | 2.20, 12°.5. { m. of 9. Precipitate. | | |
| 21 | " | " Tridymite. | | " | 2.295. } 15°–16.° | | |
| 22 | " | " | " | " | 2.326. } | | |
| 23 | " | " | " | " | 2.282. 18°.5. | | |
| 24 | Titanium dioxide. | | Rutile | $TiO_2$ | 4.249. | | |
| 25 | " | " | " | " | 4.244. | | |
| 26 | " | " | " | " | 4.250–4.291. | | |
| 27 | " | " | " | " | 4.420. 0.° | | |
| 28 | " | " | " | " | 4.26. Artificial. | | |
| 29 | " | " | " | " | 4.283. " | | |
| 30 | " | " | " | " | 4.3. " | | |
| 31 | " | " | " | " | 4.56. | | |
| 32 | " | " | (???) | " | 4.18. | | |
| 33 | " | " | " | " | 3.9311. Artif. powder. | | |

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27 Kopp. }
28 Ebelmen. 4.15.
29 Ebelmen. 12.14.
30 Hautefeuille. 16.212.
31 Müller. 5.847.
32 Klaproth.
33 Karsten. 3.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Titanium dioxide. (???) | Ti $O_2$. | 4.253. } Powder. | | |
| [2] | " " " | " | 4.255. } Ignited. | | |
| [3] | " " " | " | 4.128. | | |
| [4] | " " Brookite. | " | 4.1. Artificial. | | |
| [5] | " " " | " | 4.128. } | | |
| [6] | " " " | " | 4.131. } | | |
| [7] | " " " | " | 4.165. } | | |
| [8] | " " " | " | 4.166. } | | |
| [9] | " " " | " | 3.81. From Ural. | | |
| [10] | " " " | " | 4.216. " " | | |
| [11] | " " " | " | 3.952. Arkansite. | | |
| [12] | " " " | " | 3.892. } | | |
| [13] | " " " | " | 3.949. } | | |
| [14] | " " " | " | 4.22. | | |
| [15] | " " " | " | 4.20. | | |
| [16] | " " " | " | 4.03–4.083. Arkansite. | | |
| [17] | " " " | " | 4.085. " | | |
| [18] | " " Anatase. | " | 3.890. } | | |
| [19] | " " " | " | 3.912. } | | |
| [20] | " " " | " | 3.857. | | |
| [21] | " " " | " | 3.75. | | |
| [22] | " " " | " | 3.826. | | |
| [23] | " " " | " | 3.82. | | |
| [24] | " " " | " | 4.06. From Brazil. | | |
| [25] | " " " | " | 3.7–3.9. Artificial. | | |
| [26] | Tin monoxide. | Sn O. | 6.666. 16°5. | | |
| [27] | " dioxide. | Sn $O_2$. | 6.72. | | |
| [28] | " " | " | 6.96. | | |
| [29] | " " | " | 4.933. 17°8. } | | |
| [30] | " " | " | 6.639. 16°5. } | | |
| [31] | " " | " | 6.90. | | |
| [32] | " " | " | 6.892–7.180. | | |
| [33] | " " | " | 6.95–6.96. | | |
| [34] | " " | " | 6.831. 0.° | | |

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[10] Romanowsky. 3.704.
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[28] Mohs.
[29] [30] Herapath. 1.
[31] Boullay. 2.
[32] [33] [34] Breithaupt. Neumann. Kopp. See 23.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Tin dioxide. | $Sn O_2$ | 6.849–6.978. | | |
| [2] | " " | " | 6.7122, 4.° | | |
| [3] | " " | " | 6.753. Fr. Wicklow. | | |
| [4] | " " | " | 6.862. Fr. Mexico. | | |
| [5] | " " Bolivia. | " | 6.8432, 15°.5. } Colorless. | | |
| [6] | " " " | " | 6.8439. } | | |
| [7] | " " " | " | 7.021, 15°.5. Black. | | |
| [8] | " " " | " | 6.704, 15°.5. Yellow. | | |
| [9] | Zirconium dioxide. | $Zr O_2$. | 4.35. } Amorphous. | | |
| [10] | " " | " | to 4.90. } | | |
| [11] | " " | " | 5.49. | | |
| [12] | " " | " | 4.3. | | |
| [13] | " " | " | 5.42. | | |
| [14] | " " | " | 5.5. | | |
| [15] | " " | " | 4.9. | | |
| [16] | " | " | 5.742, 15.° | | |
| [17] | " | " | 5.710, 15.° | | |
| [18] | " " | " | 5.624, 15.° | | |
| | [Miscellaneous.] | | | | |
| [19] | Niobium pentoxide. | $Nb_2 O_5$. | 4.56. } Extremes of several | | |
| [20] | " " | " | 5.26. } determinations. | | |
| [21] | " " | " | 6.140. } From fusion | | |
| [22] | " " | " | 6.146. } with $K_2 S_2 O_7$. | | |
| [23] | " " | " | 6.48. Above, ignited. | | |
| [24] | " " | " | 5.83. More strongly heated. | | |
| [25] | " " | " | 5.90. } | | |
| [26] | " " | " | 5.98. } From | | |
| [27] | " " | " | 5.706. } chloride. | | |
| [28] | " " | " | 6.239. } | | |
| [29] | " " | " | 6.1–6.4. Ignited. | | |
| [30] | " " | " | 6.725, " | | |
| [31] | " " | " | 5.79. More strongly heated. | | |
| [32] | " " | " | 5.51–5.52. | | |

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[30] H. Rose. 12. 158.
[31] H. Rose. 12. 158.
[32] H. Rose. 12. 158.

For valuable details, as to modes of preparation, characters of samples, &c., see original paper.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Niobium pentoxide. | $Nb_2O_5$. | 4.56. } Extremes of | | |
| [2] | " " | " | 6.54. } several. | | |
| [3] | " " | " | 5.20. } 14.° | | |
| [4] | " " | " | 5.48. } Cryst. | | |
| [5] | " " | " | 4.37–4.46. } Prepared by | | |
| [6] | " " | " | 4.51–4.53. } two methods. | | |
| [7] | " " | " | 4.31. | | |
| [8] | " " | " | 5.00. | | |
| [9] | Tantalum " | $Ta_2O_5$. | 7.03. } Extremes of several | | |
| [10] | " " | " | 8.26. } determinations. | | |
| [11] | " " | " | 7.055. } From fusion | | |
| [12] | " " | " | 7.065. } with $K_2S_2O_7$. | | |
| [13] | " " | " | 7.986. Heated more strongly. | | |
| [14] | " " | " | 7.028–7.280. { From chloride. | | |
| [15] | " " | " | 7.284. Crystalline fr. $TaCl_5$. | | |
| [16] | " " | " | 7.994. Strongly ignited. | | |
| [17] | " " | " | 7.652. More strongly heated. | | |
| [18] | " " | " | 8.257. Porcelain furnace. | | |
| [19] | " " | " | 7.00. | | |
| [20] | " " | " | 7.35. Ign. precip. from $TaCl_5$. | | |
| [21] | " " | " | 8.01. From $NH_4$ Salt. | | |
| [22] | " " | " | 7.60. } From K Salt. | | |
| [23] | " " | " | 7.64. } | | |

## 2d. DOUBLE OXIDES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [24] | Sodium uranium oxide. | $Na_2O.3U_2O_3$. | 6.912. | | |
| [25] | Zinc iron oxide. | $ZnO.Fe_2O_3$. | 5.132. Artif. cryst. | | |
| [26] | Magnesium iron oxide. | $MgO\,Fe_2O_3$. | 4.568. } Magnesio- | | |
| [27] | " " " | | 4.654. } ferrite. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Manganese chromium oxide. | Mn O. $Cr_2 O_3$. | 4.87. Artif. cryst. | | |
| [2] Iron chromium " | Fe O. $Cr_2 O_3$. | 4.321. Chromite. | | |
| [3] " " " | " | 4.498. Chromite, fr. Styria | | |
| [4] " " " | " | 4.568. Chromite, fr. Pa. | | |
| [5] Zinc " " | Zn O. $Cr_2 O_3$. | 5.309. Artif. cryst. | | |
| [6] Iron aluminum " | Fe O. $Al_2 O_3$. | 3.91–3.95. Hercynite. | | |
| [7] Zinc " " | Zn O. $Al_2 O_3$. | 4.580. Cryst. | | |
| [8] " " " | " | 4.1–4.6. Automolite. | | |
| [9] " " " | " | 4.589. Gahnite. | | |
| [10] " " " | " | 4.317. Gahnite. | | |
| [11] " " " | " | 4.89. Gahnite from Franklin. | | |
| [12] " " " | " | 4.91. Gahnite from Franklin. | | |
| [13] Magnesium aluminum oxide. | Mg O. $Al_2 O_3$. | 3.452. Artif. cryst. | | |
| [14] " " " | " | 3.48–3.52. Spinel. | | |
| [15] " " " | " | 3.523. " | | |
| [16] " " " | " | 3.575. Red spinel. | | |
| [17] Glucinum aluminum oxide. | Gl O. $Al_2 O_3$. | 3.759. Artif. cryst. | | |
| [18] " " " | " | 3.597. Chrysoberyl. From three localities. | | |
| [19] " " " | " | 3.689. Chrysoberyl. From three localities. | | |
| [20] " " " | " | 3.734. Chrysoberyl. From three localities. | | |
| [21] " " " | " | 3.835. Chrysoberyl. | | |
| [22] " " " | " | 3.644. Alexandrite. | | |

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## VIII. Sulphides.

### 1st. SIMPLE SULPHIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Hydrogen sulphide. | $H_2S$. | | | s.—85°5. |
| [2] Sodium " | $Na_2S$. | 2.471. | | |
| [3] Potassium " | $K_2S$. | 2.130. | | |
| [4] Silver " | $Ag_2S$. | 6.8501. Artificial. | | |
| [5] " " | " | 7.31–7.36. Acanthite. | | |
| [6] " " | " | 7.164–7.236. " | | |
| [7] " " | " | 7.188–7.326. " | | |
| [8] " " | " | 7.269–7.317. Argentite | | |
| [9] " " | " | 7.02. Daleminzite. | | |
| [10] Thallium " | $Tl_2S$. | 8.00. | | |
| [11] Oldhamite | CaS. Impure. | 2.58. | | |
| [12] Lead monosulphide. | Pb S. | 7.220. | | |
| [13] " " | " | 7.40–7.60. | | |
| [14] " " | " | 7.587. | | |
| [15] " " | " | 7.568. | | |
| [16] " " | " | 7.5052. Artificial. | | |
| [17] " " | " | 7.539. | | |
| [18] " " | " | 6.9238. 4.° Powdered. | | |
| [19] " " | " | 7.51. From Przibram. | | |
| [20] " sesquisulphide. | $Pb_2S_3$. | 6.335. | | |
| [21] Chromium " | $Cr_2S_3$. | 4.092. | | |
| [22] " " | " | 2.79, 10.° } Two pre- | | |
| [23] " " | " | 3.77, 19.° } parations. | | |
| [24] Manganese monosulphide. | Mn S. | 3.95–4.01. } Native. | | |
| [25] " " | " | 4.014. } | | |
| [26] " " | " | 4.036. From Mexico. | | |
| [27] " disulphide. | $MnS_2$. | 3.463. Hauerite. | | |
| [28] Iron hemisulphide. | $Fe_2S$. | 5.80. | | |

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[7] Dauber. 13. 748. } localities.
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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Iron monosulphide. | Fe S. | 5.035. m. of 2. Artif. | | |
| [2] | " " | " | 4.787. Troilite. | | |
| [3] | " " | " | 4.75. " | | |
| [4] | " " | " | 4.79. Artificial. | | |
| [5] | " " | " | 4.817. Troilite. | | |
| [6] | " disulphide. | $Fe S_2$. | 5.000–5.028. Pyrite | | |
| [7] | " " | " | 5.185. Maximum of 52 det. | | |
| [8] | " " | " | 4.678. } Marcasite. | | |
| [9] | " " | " | 4.847. } | | |
| [10] | " " | " | 4.93. Pyrite. | | |
| [11] | " sesquisulphide. | $Fe_2 S_3$. | 4.246. | | |
| [12] | " " | " | 4.41. | | |
| [13] | Complex sulphide of iron. | $Fe_8 S_9$. | 4.494. | | |
| [14] | Pyrrhotite. | $Fe_7 S_8$. | 4.584. Fr. Kongsberg. | | |
| [15] | " | " | 4.546, " Bodenmais. | | |
| [16] | " | " | 4.580, " Harzburg. } | | |
| [17] | " | " | 4.564, " Mexico. } | | |
| [18] | " | " | 4.640, " Connecticut. } | | |
| [19] | Nickel hemisulphide. | $Ni_2 S$. | 6.05. | | |
| [20] | " monosulphide. | Ni S. | 4.601. Millerite. | | |
| [21] | " " | " | 5.65. " | | |
| [22] | Cobalt " | Co S. | 5.45. Syepoorite. | | |
| [23] | " disulphide. | $Co S_2$. | 4.269. | | |
| [24] | " sesquisulphide. | $Co_2 S_3$. | 4.8. | | |
| [25] | Copper hemisulphide. | $Cu_2 S$. | 5.695. | | |
| [26] | " " | " | 5.7022. Chalcocite. | | |
| [27] | " " | " | 5.792. 17°7. | | |
| [28] | " " | " | 5.9775. | | |
| [29] | " " | " | 5.71. | | |
| [30] | " monosulphide. | Cu S. | 3.8. | | |
| [31] | " " | " | 4.1634. | | |
| [32] | " " | " | 4.636. Covellite. | | |
| [33] | Palladium hemisulphide | $Pd_2 S$. | 7.303, 15.° | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Platinum monosulphide | Pt S. | 8.847, 16°25. | | |
| [2] | " disulphide. | Pt $S_2$ | 7.224, 18°75. | | |
| [3] | " " | " | 5.27. | | |
| [4] | " sesquisulphide. | $Pt_2 S_3$. | 5.52. | | |
| [5] | Molybdenum disulphide | Mo $S_2$ | 4.59. | | |
| [6] | " " | " | 4.44–4.8. Molybdenite | | |
| [7] | Tungsten disulphide. | $W_2 S_2$ | 6.26, 20.° | | |
| [8] | Zinc sulphide. | Zn S. | 3.9235. | | |
| [9] | " " | " | 4.063. White Blende. | | |
| [10] | " | " | 4.07. Blende. | | |
| [11] | " " | " | 4.05. " | | |
| [12] | " | " | 3.98. Wurtzite. | | |
| [13] | Cadmium sulphide. | Cd S. | 4.90. Greenockite. | | |
| [14] | " " | " | 4.80. " | | |
| [15] | " " | " | 4.605. | | |
| [16] | " " | " | 4.5. Artif. Cryst. | | |
| [17] | " " | " | 4.5. Artificial. | | |
| [18] | Mercury " | Hg S. | 8.998. Cinnabar. | | |
| [19] | " " | " | 8.124. | | |
| [20] | " " | " | 8.0602. | | |
| [21] | " " | " | 8.090. Cinnabar. | | |
| [22] | " " | " | 7.701.) Amorphous. | | |
| [23] | " " | " | 7.748. ) Natural. | | |
| [24] | " " | " | 7.552. Amorph. Artif. ) | | |
| [25] | Nitrogen " | N S. | 2.1166, 15.° | | |
| [26] | Phosphorus monosulphide. | P S. | 1.8. | | |
| [27] | " hexsulphide. | P $S_6$. | 2.02. | | |
| [28] | Diphosphorus trisulphide. | $P_2 S_3$. | | | 290.° |
| [29] | Tetraphosphorus " | $P_4 S_3$. | | | 142.° |
| [30] | Vanadium sulphide. | $V_2 S_4$. | 4.70, 21.° | | |
| [31] | Arsenic disulphide. | $As_2 S_2$. | 3.5444. | | |
| [32] | " " | " | 3.4–3.6. Realgar. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Arsenic trisulphide. | $As_2 S_3$. | 3.459. | | |
| [2] | " " | " | 3.48. | | |
| [3] | " " | " | 3.48. | | |
| [4] | " " | " | 3.40. | | |
| [5] | Antimony " | $Sb_2 S_3$. | 4.62. Stibnite. | | |
| [6] | " " | " | 4.516. " | | |
| [7] | " " | " | 4.7520. | | |
| [8] | " " | " | 4.15. Amorphous. | | |
| [9] | " " | " | 4.614, Black. } Massive. | | |
| [10] | " " | " | 4.641, 16° " } Powdered | | |
| [11] | " " | " | 4.280. Red. | | |
| [12] | " " | " | 4.421. Precipitated. | | |
| [13] | Bismuth disulphide. | $Bi_2 S_2$. | 7.29. m. of 5. | | |
| [14] | " trisulphide. | $Bi_2 S_3$. | 7.591, 14°5. | | |
| [15] | " " | " | 7.0001. | | |
| [16] | " " | " | 7.807. | | |
| [17] | " " | " | 7.16. Fr. Bolivia. | | |
| [18] | Carbon disulphide. | $C S_2$. | 1.272. | | |
| [19] | " " | " | 1.2693, 15°1. | 46°6. 760 m. m. | |
| [20] | " " | " | | 46°9. 753 m. m. | |
| [21] | " " | " | | 46°2. 769 m. m. | |
| [22] | " " | " | 1.265. | 45.° | |
| [23] | " " | " | 1.29312, 0.° | 47°9. 755. 8 m.m | |
| [24] | " " | " | 1.29858, 0.° m. of 2. | | |
| [25] | " " | " | 1.27904, 10.° " | 46.° | |
| [26] | " " | " | 1.26652, 17.° | 760 m.m. | |
| [27] | " " | " | 1.227431, 46° m.of 3. | | |
| [28] | " " | " | 1.2661, 20.° | 47°7. 745. 5 m.m | |
| [29] | Tin monosulphide. | Sn S. | 4.8523. | | |
| [30] | " " | " | 5.267. | | |
| [31] | " " | " | 4.973. | | |
| [32] | " disulphide. | $Sn S_2$. | 4.415. | | |
| [33] | " " | " | 4.600. | | |
| [34] | Thorium sulphide. | Th S. | 8.29. | | |

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## 2d. SULPHARSENITES, SULPHARSENATES, SULPHANTIMONITES, AND SULPHOBISMUTHITES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Proustite. | $3\,Ag_2\,S.\,As_2\,S_3$. | 5.422–5.56. | | |
| [2] Sartorite. | $Pb\,S.\,As_2\,S_3$. | 5.405. | | |
| [3] " | " | 5.393. | | |
| [4] " | " | 5.469. | | |
| [5] Dufrenoysite. | $2\,Pb\,S.\,As_2\,S_3$. | 5.5616. | | |
| [6] " | " | 5.549. | | |
| [7] " | " | 5.561. | | |
| [8] Binnite. | $3\,Cu_2\,S.\,2\,As_2\,S_3$. | 4.477. | | |
| [9] Enargite. | $3\,Cu_2\,S.\,As_2\,S_5$. | 4.362. | | |
| [10] " | " | 4.430–4.445. | | |
| [11] " | " | 4.39. Guayacanite. | | |
| [12] " | " | 4.37. | | |
| [13] " | " | 4.34. | | |
| [14] " | " | 4.43. | | |
| [15] Miargyrite. | $Ag_2\,S.\,Sb_2\,S_3$. | 5.214–5.242. | | |
| [16] Pyrargyrite. | $3\,Ag_2\,S.\,Sb_2\,S_3$. | 5.7–5.9. | | |
| [17] Stephanite. | $5\,Ag_2\,S.\,Sb_2\,S_3$. | 6.269. Fr. Przibram | | |
| [18] Zinkenite. | $Pb\,S.\,Sb_2\,S_3$. | 5.30–5.35. | | |
| [19] Boulangerite. | $3\,Pb\,S.\,Sb_2\,S_3$. | 5.75–6.00. | | |
| [20] Meneghinite. | $4\,Pb\,S.\,Sb_2\,S_3$. | 6.339–6.345. | | |
| [21] Berthierite. | $Fe\,S.\,Sb_2\,S_3$. | 4.043. | | |
| [22] Chalcostibite. | $Cu_2\,S.\,Sb_2\,S_3$. | 4.748. | | |
| [23] " | " | 5.015. | | |
| [24] Wittichenite. | $3\,Cu_2\,S.\,Bi_2\,S_3$. | 4.3. | | |
| [For Chiviatite, Plagionite, Brongniardite, Jamesonite, Friesleben ite, Bournonite, Tennantite, &c., See Dana.] | | | | |

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[See Dana for Kobellite, Aikinite, Tetrahedrite, Geocronite, Polybasite, &c.]

## 3d. MISCELLANEOUS DOUBLE AND TRIPLE SULPHIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Thallium potassium sulphide. | $K_2 S. Tl_2 S_3$. | 4.263. | | |
| [2] Iron potassium " | $K_2 S. Fe_2 S_3$. | 2.563. | | |
| [3] Sodium platinum " | $Na_2 S. 3 Pt S. Pt S_2$. | 6.27, 15.° | | |
| [4] Potassium " " | $K_2 S. 3 Pt S. Pt S_2$. | 6.44, 15.° | | |
| [5] Stromeyerite. | $Ag_2 S. Cu_2 S$. | 6.26. | | |
| [6] Pentlandite. | $Ni S. 2 Fe S_2$. | 4.6. | | |
| [7] Linnæite. | $2 Co S. Co S_2$. | 4.8–5.0. | | |
| [8] Sternbergite. | $Ag_2 S. 3 Fe S. Fe S_2$. | 4.215. | | |
| [9] Chalcopyrite. | $Cu_2 S. Fe S. Fe S_2$. | 4.185. | | |
| [10] Barnhardtite. | $2 Cu_2 S. Fe S. Fe S_2$. | 4.521. | | |
| [11] Homichlin. | $3 Cu_2 S. 3 Fe S. Fe S_2$. | 4.472–4.480. | | |
| [12] Cubanite. | $Cu_2 S. Fe S. 3 Fe S_2$. | 4.026–4.042. | | |
| [13] " | " | 4.169. | | |
| [14] " | " | 4.18. | | |
| [15] Carrollite. | $Cu_2 S. Co S. Co. S_2$. | 4.58. | | |
| [16] " | " | 4.85. | | |
| [17] Gold and Silver sulphide. | $2 Au_2 S_3. 5 Ag_2 S$. | 8.159. | | |
| [For many other native sulphides, see Dana.] | | | | |

## IX. Selenides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [18] Silver selenide. | $Ag_2 Se$. | 8.00. | | |
| [19] Thallium selenide. | $Tl_2 Se$. | | | 340.° |
| [20] Lead " | Pb Se. | 6.8. Native. | | |
| [21] " " | " | 7.6–8.8. | | |
| [22] " " | " | 8.154. | | |
| [23] Iron sesquiselenide. | $Fe_2 Se_3$. | 6.38. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Nickel selenide. | Ni Se. | 8.462. | | |
| [2] Cobalt " | Co Se. | 7.647. | | |
| [3] Copper " | Cu Se. | 6.655. | | |
| [4] Cadmium " | Cd Se. | 8.789. | | |
| [5] Mercurous " | $Hg_2$ Se. | 8.877. | | |
| [6] Mercuric " | Hg Se. | 7.274. From Tilkerode. | | |
| [7] " " | " | 7.1–7.37. " Clausthal. | | |
| [8] Arsenic triselenide. | $As_2$ $Se_3$. | 4.752. | | |
| [9] Bismuth " | $Bi_2$ $Se_3$. | 6.82. | | |
| [10] " " | " | 7.406. | | |
| [11] Tin monoselenide. | Sn Se. | 5.24. 15.° | | |
| [12] " diselenide. | Sn $Se_2$. | 5.133. | | |
| [13] " " | " | 4.85. | | |

## X. Tellurides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [14] Silver telluride. | $Ag_2$ Te. | 8.565. | | |
| [15] " " | " | 8.412. | | |
| [16] Lead " | Pb Te. | 8.159. | | |
| [17] Antimony tritelluride. | $Sb_2$ $Te_3$. | 6.47–6.51. 13.° | | |
| [18] Bismuth " | $Bi_2$ $Te_3$. | 7.237. | | |
| [19] " " | " | 7.868. | | |
| [20] " " | " | 7.941. | | |
| [21] " " | " | 7.642, 18.° | | |

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## XI. Phosphides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Silver sesquiphosphide. | $Ag_2 P_3$. | 4.63. | | |
| [2] Chromium phosphide. | Cr P. | 4.68. | | |
| [3] Manganese « | $Mn_5 P_2$. | 5.951. A mixture? | | |
| [4] « « | $Mn_3 P$. | 4.94. | | |
| [5] Iron « | $Fe_3 P_4$. | 5.04. | | |
| [6] « « | $Fe_3 P$. | 6.28. | | |
| [7] Nickel « | $Ni_3 P_2$. | 5.99. | | |
| [8] Cobalt « | $Co_3 P_2$. | 5.62. | | |
| [9] Copper « | $Cu_3 P$. | 6.75. | | |
| [10] « « | « | 6.59. | | |
| [11] Palladium « | $Pd P_2$. | 8.25. | | |
| [12] Platinum « | $Pt P_2$. | 8.77. | | |
| [13] Molybdenum « | Mo P. | 6.167. | | |
| [14] Tungsten « | $W_2 P$. | 5.207. | | |
| [15] Zinc « | $Zn_3 P_2$. | 4.76. | | |
| [16] Gold sesquiphosphide. | $Au_2 P_3$. | 6.67. | | |
| [17] Tin monophosphide. | Sn P. | 6.56. | | |

## XII. Arsenides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [18] Kaneite. | Mn As. | 5.55. | | |
| [19] Leucopyrite. | Fe $As_2$. | 6.80. Fr. Andreasberg. | | |
| [20] « | « | 7.09. « Fossum. | | |
| [21] « | « | 7.282. From Breitenbrunn. | | |
| [22] « | « | 7.259. From Breitenbrunn. | | |
| [23] « | « | 8.67. From Schladming. | | |
| [24] « | « | 8.71. From Schladming. | | |
| [25] « | « | 6.659–6.848. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lölingite. | $Fe\,As.\ Fe\,As_2$. | 7.00–7.228. | | |
| [2] " | " | 6.246. In mass. | | |
| [3] " | " | 6.321. Powdered. | | |
| [4] Niccolite. | Ni As. | 6.671–7.330. | | |
| [5] Rammelsbergite. | $Ni\,As_2$. | 7.099–7.188. | | |
| [6] Smaltite. | $Co\,As_2$. | 6.84. | | |
| [7] Skutterudite. | $Co\,As_3$. | 6.78. | | |
| [8] Whitneyite. | $Cu_9\,As$. | 8.408. | | |
| [9] " | " | 8.57–8.69. | | |
| [10] " | " | 8.246–8.471, 21.° | | |
| [11] Domeykite. | $Cu_3\,As$. | 7.75. | | |
| [12] Algodonite. | $Cu_6\,As$. | 7.62. Fr. Chili. | | |
| [13] " | " | 6.902. | | |
| [14] Allemontite. | $Sb\,As_3$. | 6.13. | | |
| [15] " | " | 6.203. | | |
| [16] Tin arsenide | $Sn_2\,As$. | 7.001, 18.° | | |
| [See Dana for fuller information upon arsenides.] | | | | |

## XIII. Antimonides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [17] Breithauptite. | Ni Sb. | 7.541. | | |
| [18] Tin antimonide. | $Sn_2\,Sb$. | 7.07, 19°. | | |
| [See also tables for alloys.] | | | | |
| [Dana's Mineralogy gives determinations for Dyscrasite, &c.] | | | | |

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## XIV. Sulphides with Oxides, Arsenides, or Antimonides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Voltzite. | 4 Zn S. Zn O. | 3.5–3.8. | | |
| [2] Kermesite. | $2Sb_2S_3.Sb_2O_3$. | 4.5–4.6. | | |
| [3] Mispickel. | $FeS_2.FeAs_2$. | 6.269. | | |
| [4] " | " | 5.896–5.893. | | |
| [5] " | " | 6.21 | | |
| [6] " | " | 5.821–6.086. | | |
| [7] " | " | 5.36–5.66. | | |
| [8] " | " | 6.095. In mass. | | |
| [9] " | " | 6.004. Powdered. | | |
| [10] " | " | 6.255. | | |
| [11] Gersdorffite. | $NiS_2.NiAs_2$. | 5.65–5.49. | | |
| [12] Cobaltite. | $CoS_2.CoAs_2$. | 6.0–6.3. | | |
| [13] Pacite. | $FeS_2.4FeAs_2$. | 6.297–6.303. | | |
| [14] Ullmannite. | $NiS_2 NiSb_2$. | 6.352–6.506. | | |

## XV. Borides, Silicides, &c.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [15] Platinum boride. | Pt B. | 17.32. | | |
| [16] Iron silicide. | $Fe_2Si$. | 6.611. | | |

## XVI. Hydrates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [17] Chloric hydrate. | $HClO_3.7H_2O$. | 1.282, 14°2. l. | | |
| [18] Perchloric hydrate. | $HClO_4$. | 1.782, 15°5. l. | | |
| [19] " " | $HClO_4.H_2O$. | 1.811, 50°. l. | | 50.° |
| [20] Iodic " | $HIO_3$. | 4.269, 0°. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Iodic hydrate. | $HIO_3$. | 4.869, 0°. | | |
| [2] " " | " | 4.816, 50°8. | | |
| [3] " " | $HIO_3 . 9H_2O$. | 2.1269, 13°. s. | | |
| [4] Periodic hydrate. | $HIO_4 . 2H_2O$. | | | 130.° |
| [5] Sodium " | Na H O. | 2.130. | | |
| [6] " " | $Na_2O . 8H_2O$. | 1.405. | | 6.° |
| [7] Potassium " | K H O. | 2.100. | | |
| [8] " " | " | 2.044. | | |
| [9] Sulphurous " | $H_2SO_3 . 8H_2O$. | | | 4.° |
| [10] Sulphuric " | $H_2SO_4$. | 1.849, 10°. | | |
| [11] " " | " | 1.842, 15°. | | |
| [12] " " | " | 1.854, 0°. | | |
| [13] " " | " | 1.842, 12°. | 338.° | 10°5. |
| [14] " " | " | 1.834, 24°. | | |
| [15] " " Fuming. | $H_2S_2O_7$. | 1.9. | | s. at 0.° |
| [16] " " | $H_2SO_4 . H_2O$. | 1.784, 8.° | 205°–210° | 8.° |
| [17] " " | " | | | 8°5. |
| [18] " " | $H_2SO_4 . 2H_2O$. | 1.62. | 193. | |
| [19] Selenic " | $H_2SeO_4$. | 2.524–2.625. | | |
| [20] " " | " | 2.627.+ tr. $H_2O$. | | |
| [21] Telluric " | $H_2TeO_4 . 2H_2O$. | 2.340. | | |
| [22] Calcium " | $CaH_2O_2$. | 2.078. | | |
| [23] Strontium " | $SrH_2O_2$. | 3.625. | | |
| [24] " " | $SrH_2O_2 . 8H_2O$. | 1.396. | | |
| [25] Barium " | $BaH_2O_2$. | 4.495. | | |
| [26] " " | $BaH_2O_2 . 8H_2O$ | 1.656. | | |
| [27] Manganese " | $Mn_2O_3 . H_2O$. | 4.335. Manganite. | | |
| [28] Turgite. | $2Fe_2O_3 . H_2O$. | 3.56–3.74. Ural. | | |
| [29] " | " | 4.29–4.49. Fr. Hof. | | |
| [30] " | " | 4.681. Fr. Horhausen. | | |
| [31] " | " | 4.14. Fr. Salisbury. | | |
| [32] Göthite. | $Fe_2O_3 . H_2O$. | 4.37. Fr. Lostwithiel. | | |
| [33] Limonite. | $2Fe_2O_3 . 3H_2O$. | 3.6–4.0. | | |
| [34] Limnite. | $Fe_2O_3 . 3H_2O$. | 2.69. Fr. Cornwall. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Uranium hydrate. | $U_2 O_3 . H_2 O$. | 5.926. | | |
| [2] Diaspore. | $Al_2 O_3 . H_2 O$. | 3.4324. | | |
| [3] " | " | 3.452. | | |
| [4] " | " | 3.45. From Asia Minor. | | |
| [5] " | " | 3.29. " Trumbull. | | |
| [6] " | " | 3.39. " Chester. | | |
| [7] " | " | 3.343. " " | | |
| [8] Gibbsite. | $Al_2 O_3 . 3 H_2 O$. | 2.387. " Ural. | | |
| [9] " | " | 2.389. " Richmond. | | |
| [10] Brucite. | $Mg H_2 O_2$. | 2.35. | | |
| [11] " | " | 2.35. | | |
| [12] " | " | 2.44. Nemalite. | | |
| [13] " | " | 2.4. Fr. Wermland. | | |
| [14] " | " | 2.36. | | |
| [15] " | " | 2.376. Fr. Orenburg. | | |
| [16] Zinc hydrate. | $Zn H_2 O_2$. | 3.053. | | |
| [17] " " | " | 2.677. | | |
| [18] Nitric " | $H N O_3$. | 1.5543. 15°5. | | |
| [19] " " | " | 1.522. 12°5. | 86.° | |
| [20] " " | " | 1.552, 15.° | 86.° | |
| [21] Nitric subhydrate. | $H_2 N_4 O_{11}$. | 1.642. 18.° | | s.+5.° |
| [22] Boric hydrate. | $B_2 O_3 . 3 H_2 O$. | 1.479. | | |
| [23] " " | " | 1.4347. 15.° | | |
| [24] Phosphorous hydrate | $H_3 P O_3$. | | | 74.° |
| [25] Phosphoric " | $P_2 O_5 . 3 H_2 O$. | 1.88. | | |
| [26] Stibiconite. | $Sb_2 O_4 . H_2 O$. | 5.28. | | |
| [27] Antimonic hydrate. | $Sb_2 O_5 . 5 H_2 O$. | 6.6. Artificial. | | |
| [28] Lead dioxide hydrate. | $Pb O_2 . H_2 O$. | 6.267. | | |
| [29] Manganese " " | $Mn O_2 . H_2 O$. | 2.564–2.596. | | |
| [30] Bismuth " " | $Bi O_2 . H_2 O$. | 5.571. | | |
| [31] Cobaltic hydrate. | $Co_2 O_3 . 2 H_2 O$. | 2.483. | | |
| [32] Nickelic | $Ni_2 O_3 . 2 H_2 O$. | 2.741. | | |

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## XVII. Chlorates and Perchlorates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium chlorate. | $NaClO_3$. | 2.467. | | |
| [2] " " | " | 2.289. | | |
| [3] Potassium " | $KClO_3$. | 2.32643, 4.° | | |
| [4] " " | " | 2.350, 17°.5. | | |
| [5] " " | " | 2.325. | | |
| [6] " " | " | | | 334.° |
| [7] Silver " | $AgClO_3$. | 4.430. | | |
| [8] Barium " | $BaCl_2O_6.H_2O$. | 2.988. 15.° | | |
| [9] Potassium perchlorate. | $KClO_4$. | 2.528–2.550. | | |
| [10] Thallium " | $TlClO_4$. | 4.844. 15°.5. | | |

## XVIII. Bromates and Iodates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [11] Sodium bromate. | $NaBrO_3$. | 3.339, 17°.5. | | |
| [12] Potassium " | $KBrO_3$. | 3.271, 17°.5. | | |
| [13] Sodium iodate. | $NaIO_3$. | 4.277, 17°.5. | | |
| [14] Potassium iodate. | $KIO_3$. | 3.979, 17°.5. | | |
| [15] " " | " | 2.601. | | |

## XIX. Sulphites and Hyposulphites.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [16] Sodium sulphite. | $Na_2SO_3.10H_2O$. | 1.561. | | |
| [17] Sodium hyposulphite | $Na_2S_2O_3.5H_2O$. | 1.672. | | |
| [18] " " | " | 1.736, 10.° | | 45.° |
| [19] " " | " | | | 56.° |
| [20] " " | " | 1.734. | | |
| [21] Potassium " | $K_2S_2O_3$. | 2.590. | | |

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## XX. Sulphates.

### 1st. SIMPLE, ANHYDROUS SULPHATES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Lithium sulphate. | $Li_2 S O_4$. | 2.210. | | |
| [2] | Sodium " | $Na_2 S O_4$. | 2.462. | | |
| [3] | " " | " | 2.645. | | |
| [4] | " " | " | 2.67. | | |
| [5] | " " | " | 2.73. | | |
| [6] | " " | " | 2.640. | | |
| [7] | " " | " | 2.6313. | | |
| [8] | " " | " | 2.597. | | |
| [9] | " " | " | 2.629. | | |
| [10] | " " | " | 2.65606, 4°. | | |
| [11] | " " | " | 2.654–2.658. } Crystallized at different temperatures. | | |
| [12] | " " | " | 2.674–2.684. } | | |
| [13] | " " | " | 2.693. m. of 3. | | |
| [14] | Potassium " | $K_2 S O_4$. | 2.636. | | |
| [15] | " " | " | 2.4073. | | |
| [16] | " " | " | 2.400. | | |
| [17] | " " | " | 2.6232. | | |
| [18] | " " | " | 2.880. | | |
| [19] | " " | " | 2.662. | | |
| [20] | " " | " | 2.640. | | |
| [21] | " " | " | 2.625. | | |
| [22] | " " | " | 2.644. Cryst. } | | |
| [23] | " " | " | 2.657. After fusion. } | | |
| [24] | " " | " | 2.653. | | |
| [25] | " " | " | 2.658. | | |
| [26] | " " | " | 2.572. | | |
| [27] | " " | " | 2.645. | | |
| [28] | " disulphate. | $K_2 S_2 O_7$. | 2.277. | | 210.° |
| [29] | Ammonium sulphate | $(N H_4)_2 S O_4$. | 1.750. | | |
| [30] | " " | " | 1.76147, 4°. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Ammonium sulphate | $(NH_4)_2SO_4$. | 1.7676. | | |
| [2] | " " | " | 1.76—1.78. | | |
| [3] | " " | " | 1.628. | | |
| [4] | " " | " | 1.771. m. of 2. | | |
| [5] | " " | " | 1.750. | | |
| [6] | " " | " | | | 140.° |
| [7] | Silver " | $Ag_2SO_4$. | 5.341. | | |
| [8] | " " | " | 5.322. | | |
| [9] | " " | " | 5.410. | | |
| [10] | " " | " | 5.425. | | |
| [11] | Thallium " | $Tl_2SO_4$. | 6.77. | | |
| [12] | " " | " | 6.603. | | |
| [13] | Calcium " | $CaSO_4$. | 2.9271. | | |
| [14] | " " | " | 2.960. | | |
| [15] | " " | " | 3.102. | | |
| [16] | " " | " | 2.969. Artif. cryst. | | |
| [17] | " " | " | 2.983. Anhydrite. | | |
| [18] | " " | " | 2.92, 15°. Anhydrite. | | |
| [19] | Strontium " | $SrSO_4$. | 3.973. Celestine. | | |
| [20] | " " | " | 3.9593. " | | |
| [21] | " " | " | 3.96. " | | |
| [22] | " " | " | 3.86. " | | |
| [23] | " " | " | 3.962, 0°. " | | |
| [24] | " " | " | 3.927. Artif. cryst. | | |
| [25] | " " | " | 3.5883. Precipitated. | | |
| [26] | " " | " | 3.770. " | | |
| [27] | " " | " | 3.707. " | | |
| [28] | Barium " | $BaSO_4$. | 4.42. | | |
| [29] | " " | " | 4.446. | | |
| [30] | " " | " | 4.2003. | | |
| [31] | " " | " | 4.4695, 0°. | | |
| [32] | " " | " | 4.4773. } Barite. Extremes of seven determinations. | | |
| [33] | " " | " | 4.4872. } | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Barium Sulphate. | $BaSO_4$. | 4.4794. Barite in | | |
| [2] | " " | " | 4.4804. powder. | | |
| [3] | " " | " | 4.5271. Precipitated. | | |
| [4] | " " | " | 4.5253. | | |
| [5] | " " | " | 4.179. Artif. cryst. | | |
| [6] | " " | " | 4.512. Precipitates | | |
| [7] | " " | " | 4.022. in different | | |
| [8] | " " | " | 4.065. conditions. | | |
| [9] | Lead " | $PbSO_4$. | 6.298. | | |
| [10] | " " | " | 6.1691. | | |
| [11] | " " | " | 6.30. | | |
| [12] | " " | " | 6.35. Fr. Phœnixville. | | |
| [13] | " " | " | 6.20. Fr. Coquimbo. | | |
| [14] | Manganese monosulphate. | $MnSO_4$. | 3.1, 14.° | | |
| [15] | Iron monosulphate. | $FeSO_4$. | 2.841. | | |
| [16] | " " | " | 3.138. | | |
| [17] | Cobalt " | $CoSO_4$. | 3.531. | | |
| [18] | Copper " | $CuSO_4$. | 3.631. | | |
| [19] | " " | " | 3.572. | | |
| [20] | " " | " | 3.530. | | |
| [21] | Zinc " | $ZnSO_4$. | 3.681. m. of 2. | | |
| [22] | " " | " | 3.400. | | |
| [23] | " " | " | 3.400. | | |
| [24] | Magnesium " | $MgSO_4$. | 2.6066. | | |
| [25] | " " | " | 2.706. m. of 2. | | |
| [26] | " " | " | 2.628. | | |
| [27] | Mercurous sulphate. | $Hg_2SO_4$. | 7.560. | | |
| [28] | Mercuric " | $HgSO_4$. | 6.466. | | |
| [29] | Aluminum " | $Al_2(SO_4)_3$. | 2.7400. | | |
| [30] | " " | " | 2.171. | | |
| [31] | Alumian. | $Al_2O_3.2SO_3$. | 2.702–2.781. | | |

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## 2d. SIMPLE HYDRATED SULPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lithium sulphate. | $Li_2 S O_4 . H_2 O$. | 2.02. | | |
| [2] Sodium " | $Na_2 S O_4 . 10 H_2 O$. | 1.469. m. of 2. | | |
| [3] " " | " | 1.4457. | | |
| [4] " " | " | 1.520. | | |
| [5] " " | " | 1.350. | | |
| [6] " " | " | 1.465. | | |
| [7] " " | " | 1.471. | | |
| [8] " " | " | 1.4608. ) | | |
| [9] " " | " | 1.4595. ( | | |
| [10] Mascagnite. | $(N H_4)_2 S O_4 . H_2 O$. | 1.72—1.73. | | |
| [11] Calcium sulphate. | $2 Ca S O_4 . H_2 O$. | 2.757. | | |
| [12] " " | $Ca S O_4 . 2 H_2 O$. | 2.322. | | |
| [13] " " | " | 2.310. | | |
| [14] " " | " | 2.307. Gypsum. | | |
| [15] " " | " | 2.331. | | |
| [16] " " | | 2.317. m. of 15. Gypsum. | | |
| [17] " " | | 2.3057. | | |
| [Vitriols.] | | | | |
| [18] Manganese sulphate. | $Mn S O_4 . 5 H_2 O$. | 1.834. | | |
| [19] " " | " | 2.095–2.087. | | |
| [20] Iron " | $Fe S O_4 . 7 H_2 O$. | 1.857. m. of 3. | | |
| [21] " " | " | 1.8889, 4.° | | |
| [22] " " | " | 1.8399. | | |
| [23] " " | " | 1.904. | | |
| [24] " " | " | 1.884. | | |
| [25] " " | " | 1.902. | | |
| [26] Nickel " | $Ni S O_4 . 7 H_2 O$. | 2.037. | | |
| [27] " " | " | 1.931. | | |
| [28] " " | " | 2.004. Morenosite. | | |
| [29] Cobalt " | $Co S O_4 . 7 H_2 O$. | 1.924. | | |
| [30] Copper " | $Cu S O_4 . 5 H_2 O$. | 2.2. | | |
| [31] " " | " | 2.1943. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Copper sulphate. | $Cu\ S\ O_4.5\ H_2O.$ | 2.297. Natural. | | |
| [2] " " | " | 2.274. | | |
| [3] " " | " | 2.254. | | |
| [4] " " | " | 2.286. | | |
| [5] " " | " | 2.2901. } 4.° | | |
| [6] " " | " | 2.2422. } 4.° | | |
| [7] " " | " | 2.2781. } 4.° | | |
| [8] " " | " | 2.302. | | |
| [9] " " | " | 2.2778. | | |
| [10] Zinc " | $Zn\ S\ O^4.7\ H_2O.$ | 2.036. | | |
| [11] " " | " | 1.912. | | |
| [12] " " | " | 1.931. m. of 4. | | |
| [13] " " | " | 2.036. | | |
| [14] " " | " | 1.953. | | |
| [15] " " | " | 1.957, | | |
| [16] " " | " | 1.9534. | | |
| [17] Magnesium " | $Mg\ S\ O_4.7\ H_2O.$ | 1.751. | | |
| [18] " " | " | 1.6603. | | |
| [19] " " | " | 1.674. | | |
| [20] " " | " | 1.660. | | |
| [21] " " | " | 1.6829, 4.° | | |
| [22] " " | " | 1.751. | | |
| [23] " " | " | 1.685. | | |
| [24] " " | " | 1.675. | | |
| [25] " " | " | 1.636, 15°5. Epsomite. | | |
| [26] " " | $Mg\ S\ O_4.\ H_2O.$ | 2.517. Kieserite. | | |
| [27] Cadmium " | $Cd\ S\ O_4.\ H_2O.$ | 2.939. | | |
| [28] " " | $3\ Cd\ S\ O_4.\ 8\ H_2O.$ | 3.05. 12.° | | |
| [29] Chromic " | $Cr_2\ (SO_4)_3.\ 15\ H_2O.$ | 1.696. 22.° | | |
| [30] Coquimbite. | $Fe_2\ (S\ O_4)_3\ 9\ H_2O.$ | 2.0–2.1. | | |
| [31] Copiapite. | $2Fe_2O_3.5SO_3.12H_2O$ | 2.14. | | |
| [32] Raimondite. | $2Fe_2O_3.3SO_3.7\ H_2O$ | 3.190–3.222. | | |
| [33] Fibroferrite. | $2Fe_2O_3.5SO_3.27H_2O$ | 1.84. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Aluminum sulphate. | $Al_2(SO_4)_3.18H_2O$. | 1.671. m. of 2. | | |
| [2] " " | " | 1.569. | | |
| [3] " " | " | 1.6–1.8. Alunogen. | | |
| [4] Aluminite. | $Al_2O_3SO_3.9H_2O$. | 1.66. | | |
| [5] Felsobanyite. | $2Al_2O_3.SO_3.10H_2O$ | 2.33. | | |

## 3d. ANHYDROUS DOUBLE SULPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [6] Sodium hydrogen sulphate. | $NaHSO_4$. | 2.742. | | |
| [7] Potassium " " | $KHSO_4$. | 2.163. | | |
| [8] " " " | " | 2.112. | | |
| [9] " " " | " | 2.475. m. of 2. | | |
| [10] " " " | " | 2.47767, 4.° | | |
| [11] Ammonium " " | $NH_4.HSO_4$. | 1.761. m. of 2. | | |
| [12] " " " | " | 1.787. | | |
| [13] Sodium potassium " | $3K_2SO_4.Na_2SO_4$. | 2.668. Pulv.cryst. | | |
| [14] " " " | " | 2.671. Aft.fusion. | | |
| [15] Ammonium " " | $NH_4.KSO_4$. | 2.280. | | |
| [16] Glauberite. | $CaSO_4.Na_2SO_4$. | 2.767. | | |
| [17] " | " | 2.64. | | |
| [18] Dreelite. | $CaSO_4.3BaSO_4$. | 3.2–3.4. | | |
| [19] Potassium aluminum sulphate. | $AlK(SO_4)_2$. | 2.228. m. of 2. | | |
| [20] Ammonium aluminum sulphate. | $NH_4.K(SO_4)_2$. | 2.039. | | |
| [21] Manganese potassium sulphate. | $MnK_2(SO_4)_2$. | 3.008. m. of 2. | | |
| [22] Nickel potassium " | $NiK_2(SO_4)_2$. | 2.897. m. of 2. | | |
| [23] Copper " " | $CuK_2(SO_4)_2$. | 2.797. m. of 2. | | |
| [24] " ammonium " | $Cu(NH_4)_2(SO_4)_2$. | 2.197. m. of 2. | | |
| [25] Zinc potassium " | $ZnK_2(SO_4)_2$. | 2.816. | | |
| [26] " ammonium " | $Zn(NH_4)_2(SO_4)_2$. | 2.222. | | |
| [27] Magnesium potassium sulphate. | $MgK(SO_4)_2$. | 2.676. | | |

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## 4th. HYDRATED DOUBLE SULPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ammonium sodium sulphate. | $N H_4 . Na S O_4 . 2 H_2 O$. | 1.63. | | |
| [2] Manganese ammonium sulphate. | $(NH_4)_2 Mn (SO_4)_2 . 6 H_2 O$ | 1.930. | | |
| [3] Iron potassium sulphate | $K_2 Fe (S O_4)_2 . 6 H_2 O$. | 2.202. | | |
| [4] " " " | " | 2.189. | | |
| [5] " ammonium " | $(NH_4)_2 Fe (SO_4)_2 . 6 H_2 O$ | 1.848. m. of 2. | | |
| [6] " " " | " | 1.813. | | |
| [7] Nickel potassium " | $K_2 Ni (S O_4)_2 . 6 H_2 O$. | 2.111–2.136. | | |
| [8] " ammonium " | $(NH_4)_2 Ni (SO_4)_2 . 6 H_2 O$ | 1.783. | | |
| [9] " " " | " | 1.915. | | |
| [10] " " " | " | 1.921. | | |
| [11] Cobalt potassium " | $K_2 Co (S O_4)_2 . 6 H_2 O$. | 2.154. | | |
| [12] " ammonium " | $(NH_4)_2 Co (SO_4)_2 . 6 H_2 O$ | 1.873. | | |
| [13] Copper potassium " | $K_2 Cu (S O_4)_2 . 6 H_2 O$. | 2.244. m. of 2. | | |
| [14] " " " | " | 2.16376, 4.° | | |
| [15] " " " | " | 2.137. | | |
| [16] " ammonium " | $(NH_4)_2 Cu (SO_4)_2 . 6 H_2 O$ | 1.756–1.757. | | |
| [17] " " " | " | 1.891. m. of 2. | | |
| [18] " " " | " | 1.89378, 4.° | | |
| [19] " " " | " | 1.931. | | |
| [20] Zinc potassium " | $K_2 Zn (S O_4)_2 . 6 H_2 O$. | 2.153. | | |
| [21] " " " | " | 2.245. | | |
| [22] " " " | " | 2.24034, 4.° | | |
| [23] " " " | " | 2.153. | | |
| [24] " ammonium " | $(NH_4)_2 Zn (SO_4)_2 . 6 H_2 O$ | 1.897. m. of 2. | | |
| [25] " " " | | 1.910. | | |
| [26] Cadmium potassium sulphate. | $K_2 Cd (S O_4)_2 . 6 H_2 O$. | 2.438. | | |
| [27] Cadmium ammonium sulphate. | $(NH_4)_2 Cd (SO_4)_2 . 6 H_2 O$ | 2.073. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Magnesium potassium sulphate. | $K_2 Mg (S O_4)_2 . 6 H_2 O$. | 2.076. m. of 2. | | |
| [2] | " " " | " | 2.05319, 4.° | | |
| [3] | " " " | " | 1.995. | | |
| [4] | " ammonium " | $(NH_4)_2 Mg (SO_4)_2 . 6 H_2 O$ | 1.696. | | |
| [5] | " " " | " | 1.721. | | |
| [6] | " " " | " | 1.71686, 4.° | | |
| [7] | " " " | " | 1.680. | | |
| [8] | " " " | " | 1.762. | | |
| [9] | Lœwite. | $2MgSO_4 . 2Na_2SO_4 . 5H_2O$ | 2.376. | | |
| [10] | Fauserite. | $MgSO_4 . 2MnSO_4 . 15H_2O$ | 1.88. | | |
| [11] | Magnesium iron sulphate. | $Mg Fe (S O_4)_2 . 14 H_2 O$. | 1.733. | | |
| [12] | " copper " | $Mg Cu (S O_4)_2 . 14 H_2 O$. | 1.813. | | |
| [13] | " zinc " | $Mg Zn (S O_4)_2 . 14 H_2 O$. | 1.817. | | |
| [14] | " cadmium " | $Mg Cd (S O_4)_2 . 14 H_2 O$. | 1.983. | | |
| | [Alums.] | | | | |
| [15] | Sodium alum. | $Al Na (S O_4)_2 . 12 H_2 O$. | 1.641. | | |
| [16] | " " | " | 1.567. | | |
| [17] | Potassium " | $Al K (S O_4)_2 . 12 H_2 O$. | 1.753. | | |
| [18] | " " | " | 1.7109. | | |
| [19] | " " | " | 1.724. | | |
| [20] | " " | " | 1.726. m. of 4. | | |
| [21] | " " | " | 1.75125, 4.° | | |
| [22] | " " | " | 4.722. | | |
| [23] | " " | " | 1.757. | | |
| [24] | " " | " | 1.7505. | | |
| [25] | Rubidium alum. | $Al Rb (S O_4)_2 . 12 H_2 O$. | 1.874. | | |
| [26] | Cæsium " | $Al Cs (S O_4)_2 . 12 H_2 O$. | 2.003. | | |
| [27] | Ammonium " | $Al(NH_4)(SO_4)_2 . 12 H_2 O$. | 1.602. | | |
| [28] | " " | " | 1.625. | | |
| [29] | " " | " | 1.626. | | |
| [30] | " " | " | 1.625. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ammonium alum. | $Al(NH_4)(SO_4)_2.12H_2O.$ | 1.621. | | |
| [2] " " | " | 1.653. | | |
| [3] Potassium chrome alum | $Cr\,K\,(S\,O_4)_2.\,12\,H_2\,O.$ | 1.848. | | |
| [4] " " " | " | 1.826. | | |
| [5] " " " | " | 1.85609, 4.° | | |
| [6] " " " | " | 1.845, 12.° | | |
| [7] Ammonium " " | $Cr(NH_4)(SO_4)_2.12H_2O.$ | 1.738, 21.° | | |
| [8] " iron " | $Fe(NH_4)(SO_4)_2.12H_2O.$ | 1.712. | | |
| [9] " " " | " | 1.718. | | |
| [10] Jarosite. | $K_2SO_4.4Fe_2SO_6.9H_2O.$ | 3.256. | | |
| [11] Alunite. | $K_2SO_4.3Al_2SO_6.6H_2O.$ | 2.481. | | |
| [12] Löwigite. | $K_2SO_4.3Al_2SO_6.9H_2O.$ | 2.58. | | |

## 5th. BASIC AND AMMONIO-SULPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Turpeth mineral. | $Hg\,S\,O_4.\,2\,Hg\,O.$ | 8.319. | | |
| [14] Basic copper sulphate. | $4\,Cu\,O.\,S\,O_3.\,4\,H_2\,O.$ | 3.082. m. of 2. | | |
| [15] " zinc " | $4\,Zn\,O.\,S\,O_3.\,4\,H_2\,O.$ | 3.122. | | |
| [16] Linarite. | $Pb\,S\,O_4.\,Cu\,H_2\,O_2.$ | 5.43. | | |
| [17] Brochantite. | $2\,Cu\,S\,O_4.\,5\,Cu\,H_2\,O_2.$ | 3.78–3.87. | | |
| [18] " | " | 3.9069. | | |
| [19] Waringtonite. | " | 3.39–3.47. | | |
| [20] Langite. | $CuSO_4.3CuH_2O_2.H_2O.$ | 3.48–3.50. | | |
| [21] Silver ammonio sulphate. | $Ag_2\,S\,O_4.\,4\,N\,H_3.$ | 2.918. m. of 2. | | |
| [22] Copper " " | $Cu\,S\,O_4.\,2\,N\,H_3.$ | 2.476. | | |
| [23] " " " | $Cu\,S\,O_4.\,2\,N\,H_3.\,3\,H_2\,O.$ | 1.950. | | |
| [24] " " " | $Cu\,S\,O_4.\,4\,N\,H_3.\,H_2\,O.$ | 1.790, {Large Cryst. | | |
| [25] " " " | " | 1.809, {Small Cryst. | | |
| [26] Zinc " " | $Zn\,S\,O_4.\,2\,N\,H_3.$ | 2.479. | | |
| [27] Tetramercurammonium sulphate. | $(N_2\,Hg_4)\,S\,O_4.\,2\,H_2\,O.$ | 7.319. | | |

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## XXI. Selenites and Selenates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Mercury sub-selenite. | $3\,Hg_2\,O.\,4\,Se\,O_2$. | 7.35. | | |
| [2] Barium selenate. | $Ba\,Se\,O_4$. | 4.67, 22.° | | |
| [3] Lead " | $Pb\,Se\,O_4$. | 6.37, 22.° | | |
| [4] Yttrium " | $Y\,Se\,O_4.\,3\,H_2\,O$. | 2.6770. | | |
| [5] Selenic alum. | $Al\,K(Se\,O_4)_2.12\,H_2O$. | 1.971. | | |

## XXII. Chromates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [6] Potassium chromate. | $K_2\,Cr\,O_4$. | 2.612. | | |
| [7] " " | " | 2.6402. | | |
| [8] " " | " | 2.705. | | |
| [9] " " | " | 2.682. m. of 10. | | |
| [10] " " | " | 2.711. } 4.° | | |
| [11] " " | " | 2.72309. } | | |
| [12] " " | " | 2.691. | | |
| [13] " " | " | 2.7343. | | |
| [14] " dichromate. | $K_2\,Cr_2\,O_7$. | 2.6027. | | |
| [15] " " | " | 2.624. | | |
| [16] " " | " | 2.692, 4.° | | |
| [17] " " | " | 2.721. | | |
| [18] " " | " | 2.6616. } 15.° | | |
| [19] " " | " | 2.6806. } | | |
| [20] Ammonium " | $(N\,H_4)_2\,Cr_2\,O_7$. | 2.367. | | |
| [21] Potassium trichromate | $K_2\,Cr_3\,O_{10}$. | 2.655. m. of 3. | | |
| [22] " " | " | 3.613. | | |
| [23] Silver chromate. | $Ag_2\,Cr\,O_4$. | 5.770. | | |
| [24] Barium " | $Ba\,Cr\,O_4$. | 3.90, 11.° | | |
| [25] " " | " | 4.49, 23.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lead chromate. | Pb Cr $O_4$. | 6.00. | | |
| [2] " " | " | 5.95. | | |
| [3] " " | " | 5.653. | | |
| [4] " " | " | 6.118. Artif. cryst. | | |
| [5] Phœnicochroite. | 3 Pb O. 2 Cr $O_3$. | 5.75. | | |
| [6] Basic lead chromate. | 2 Pb O. Cr $O_3$. | 6.266. | | |
| [7] Chromic chromate. | 2 $Cr_2$ $O_3$. Cr $O_3$. | 4.0, 10.° | | |
| [8] Copper chromate. | Cu Cr $O_4$. 5 $H_2$ O. | 2.262. | | |
| [9] Zinc " | Zn Cr $O_4$. 7 $H_2$ O. | 2.096. | | |
| [10] Magnesium chromate. | Mg Cr $O_4$. 7 $H_2$ O. | 1.66, 15.° | | |
| [11] " " | " | 1.75, 12.° | | |
| [12] Silver ammonio " | $Ag_2$ Cr $O_4$. 4 N $H_3$. | 3.063. m. of 2. | | |

## XXIII. Manganates and Permanganates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Barium manganate. | Ba Mn $O_4$. | 4.85, 23.° | | |
| [14] Potassium permanganate. | K Mn $O_4$. | 2.709. | | |
| [15] " " | " | 2.710. | | |

## XXIV. Molybdates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [16] Lead molybdate. | Pb Mo $O_4$. | 5.706. Wulfenite. | | |
| [17] " " | " | 6.76. " | | |
| [18] " " | " | 6.95. " | | |
| [19] " " | " | 8.11. Artif. cryst. | | |

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## XXV. Tungstates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium tungstate. | $3\,Na_2\,O.\,7\,W\,O_3$. | 5.4983. | | |
| [2] " " | $3Na_2O.7WO_3.16H_2O$ | 3.987, 14.° | | |
| [3] " metatungstate. | $Na_2\,W_4\,O_{13}.\,10\,H_2\,O$. | 3.8467, 13.° | | |
| [4] " tungsten tungstate | $Na_2\,O.\,W\,O_2.\,2\,W\,O_3$. | 6.617. | | |
| [5] " " " | $Na_2O.2WO_2.2WO_3$. | 7.283. | | |
| [6] Potassium tungsten tungstate. | $K_2\,W\,O_4.\,4\,W\,O_2$. | 7.6. | | |
| [7] Calcium tungstate. | $Ca\,W\,O_4$. | 6.04. Scheelite. | | |
| [8] " " | " | 6.03. | | |
| [9] " " | " | 6.071. | | |
| [10] " " | " | 6.05. | | |
| [11] " " | " | 6.03. Scheelite. | | |
| [12] " " | " | 6.076. Artif cryst. | | |
| [13] " " | " | 6.02. Scheelite. | | |
| [14] Barium metatungstate | $Ba\,W_4\,O_{13}.\,9\,H_2\,O$. | 4.298, 14.° | | |
| [15] Lead tungstate. | $Pb\,W\,O_4$. | 8.0. | | |
| [16] " " | " | 8.1. | | |
| [17] " " | " | 8.1032, In mass. | | |
| [18] " " | " | 8.1275, Powdered. | | |
| [19] " " | " | 8.232. Artif. cryst. | | |
| [20] " " | " | 8.238. Artif. cryst. | | |
| [21] " " | " | 7.87. Fr. Chili. | | |
| [22] Manganese tungstate. | $Mn\,W\,O_4$. | 6.7. Artificial. | | |
| [23] " " | " | 7.14. Hübnerite. | | |
| [24] Iron " | $Fe\,W\,O_4$. | 7.1. Artificial. | | |
| [25] " " | " | 7.169. Ferberite. | | |
| [26] " " | " | 6.801. " | | |
| [27] " manganese " | $2MnWO_4.3FeWO_4$. | 7.0. Artificial. | | |
| [28] Wolfram. | $Fe\,W\,O_4.\,4\,Mn\,O_4$. | 6.67. | | |
| [29] " | $2\,Fe\,W\,O_4.\,3\,Mn\,O_4$. | 7.191. | | |
| [30] " | " | 7.189–7.535. | | |
| [31] " | Miscellaneous formulæ | 7.1–7.55. | | |

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[31] _____ }

## XXVI. Borates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium diborate. | $Na_2 B_4 O_7$. | 2.367. | | |
| [2] " " | $Na_2 B_4 O_7$. 5 $H_2 O$. | 1.815. | | |
| [3] " " | $Na_2 B_4 O_7$. 10 $H_2 O$. | 1.757. | | |
| [4] " " | " | 1.723. | | |
| [5] " " | " | 1.716. | | |
| [6] " " | " | 1.74. | | |
| [7] " " | " | 1.730. m. of 2. | | |
| [8] " " | " | 1.692. | | |
| [9] " " | " | 1.692. | | |
| [10] " " | " | 1.7156. | | |
| [11] Potassium " | $K_2 B_4 O_7$. | 1.740. | | |
| [12] Lead borate. | $Pb B_2 O_4$ | 5.598. } Fused to | | |
| [13] " hydrogen borate | $Pb H B_3 O_6$. | 5.235. } glass. | | |
| [14] Magnesium " | $Mg_3 B_2 O_6$. | 2.987. Cryst. | | |
| [15] Didymium " | 6 Di O. $B_2 O_3$. | 5.825, 14.° | | |
| [16] Magnesium chromium borate. | 3 $Cr_2 O_3$. 6 Mg O. 2 $B_2 O_3$. | 3.82. Cryst. | | |
| [17] Magnesium iron borate. | 3 $Fe_2 O_3$. 6 Mg O. 2 $B_2 O_3$. | 3.85. Cryst. | | |
| [18] Szaibelyite. | (5 Mg O. 2 $B_2 O_3$)$_3$. 4 $H_2 O$. | 3.0. | | |
| [19] Hydroboracite. | 3CaO.3MgO.8$B_2O_3$.18$H_2O$ | 1.9. | | |

## XXVII. Nitrates.

### 1st. SIMPLE, ANHYDROUS NITRATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [20] Lithium nitrate. | Li N $O_3$. | 2.334. | | |
| [21] " " | " | 2.442. | | |
| [22] Sodium " | Na N $O_3$. | 2.096. | | |
| [23] " " | " | 2.188. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Sodium nitrate. | $Na\ N\ O_3$. | 2.0964. | | |
| [2] | " " | " | 2.200. | | |
| [3] | " " | " | 2.2256. | | |
| [4] | " " | " | 2.182. m. of 4. | | |
| [5] | " " | " | 2.2606, 4.° | | |
| [6] | " " | " | | | 310°5. |
| [7] | " " | " | 2.26. | | |
| [8] | " " | " | | | 313°1. |
| [9] | " " | " | 2.256. | | |
| [10] | " " | " | 2.265. | | |
| [11] | " " | " | 2.236. | | |
| [12] | " " | " | 2.18, 15°5. Native. | | |
| [13] | " " | " | 2.290. " | | |
| [14] | Potassium nitrate. | $K\ N\ O_3$. | 1.933. | | |
| [15] | " " | " | 1.9369. | | |
| [16] | " " | " | 2.1006. | | |
| [17] | " " | " | 2.058. | | |
| [18] | " " | " | 2.070. m. of 3. | | |
| [19] | " " | " | 2.1078. } | | |
| [20] | " " | " | 2.09584. } 4°. | | |
| [21] | " " | " | 2.10657. } | | |
| [22] | " " | " | 2.109. Large crystals. } | | |
| [23] | " " | " | 2.143. Small " } | | |
| [24] | " " | " | 2.132. After fusion. } | | |
| [25] | " " | " | | | 339.° |
| [26] | " " | " | | | 338°3. |
| [27] | " " | " | 2.100. | | |
| [28] | " " | " | 2.086. | | |
| [29] | " " | " | 2.126. | | |
| [30] | " " | " | 2.105. | | |
| [31] | " " | " | 2.0845. } | | |
| [32] | " " | " | 2.0904. } | | |
| [33] | Ammonium " | $N\ H_4.\ N\ O_3$. | | 180.° | 108.° |
| [34] | " " | " | 1.579. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Ammonium nitrate. | $N H_4 . N O_3$. | 1.707. | | |
| [2] | " " | " | 1.635. m. of 3. | | |
| [3] | " " | " | 1.737. m. of 2. | | |
| [4] | " " | " | 1.709. | | |
| [5] | " " | " | 1.723. | | |
| [6] | " " | " | 1.6915. | | |
| [7] | Silver nitrate. | $Ag N O_3$ | 4.3554. | | |
| [8] | " " | " | 4.336. | | |
| [9] | " " | " | | | 198.° |
| [10] | " " | " | 4.238. | | |
| [11] | " " | " | 4.253. | | |
| [12] | " " | " | 4.271. | | |
| [13] | " " | " | 4.328. | | |
| [14] | Thallium nitrate. | $Tl N O_3$. | 5.8. | | |
| [15] | " " | " | | | 205.° |
| [16] | " " | " | 5.55. | | |
| [17] | Calcium " | $Ca N_2 O_6$. | 2.240. | | |
| [18] | " " | " | 2.472. | | |
| [19] | Strontium " | $Sr N_2 O_6$. | 3.0061. | | |
| [20] | " " | " | 2.8901. | | |
| [21] | " " | " | 2.704. | | |
| [22] | " " | " | 2.857. | | |
| [23] | " " | " | 2.962. m. of 4. | | |
| [24] | " " | " | 2.305. | | |
| [25] | Barium " | $Ba N_2 O_6$. | 2.9149. | | |
| [26] | " " | " | 3.1848. | | |
| [27] | " " | " | 3.284. m. of 5. | | |
| [28] | " " | " | 3.16052, 4.° | | |
| [29] | " " | " | 3.200. | | |
| [30] | " " | " | 3.240–3.242. Cryst. at different temperatures. | | |
| [31] | " " | " | 3.228–3.222. | | |
| [32] | " " | " | 3.208–3.241. | | |
| [33] | " " | " | 3.404. | | |
| [34] | Lead " | $Pb N_2 O_6$. | 4.068. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lead nitrate. | $Pb\ N_2\ O_6$. | 4.769. | | |
| [2] " " | " | 4.3998. | | |
| [3] " " | " | 4.340. | | |
| [4] " " | " | 4.316. m. of 3. | | |
| [5] " " | " | 4.472, 4.° | | |
| [6] " " | " | 4.581. | | |
| [7] " " | " | 4.429. | | |
| [8] " " | " | 4.423. | | |
| [9] " " | " | 4.509. | | |
| [10] " " | " | 4.235. | | |

## 2d. HYDRATED NITRATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [11] Calcium nitrate. | $Ca\ N_2\ O_6 . 4\ H_2\ O$. | 1.78. | | |
| [12] " " | " | 1.90, 15°5. s. | 132.° | 44.° |
| [13] " " | " | 1.79, 15°5. l. | | |
| [14] Strontium " | $Sr\ N_2\ O_6 . 5\ H_2\ O$. | 2.113. | | |
| [15] Manganese " | $Mn\ N_2\ O_6 . 6\ H_2\ O$. | 1.8199, 21.° s. | 129°5. | 25°8. |
| [16] " " | " | 1.8104, 21.° l. | | |
| [17] Nickel " | $Ni\ N_2\ O_6 . 6\ H_2\ O$. | | 136°7. | 56°7. |
| [18] Cobalt " | $Co\ N_2\ O_6 . 6\ H_2\ O$. | 1.83, 14.° | | |
| [19] Copper " | $Cu\ N_2\ O_6 . 3\ H_2\ O$. | 2.174. | | |
| [20] " " | " | 2.047. m. of 3. | | |
| [21] " " | " | | 170.° | 114°5. |
| [22] Zinc " | $Zn\ N_2\ O_6 . 6\ H_2\ O$. | | 131.° | 36°4. |
| [23] Magnesium " | $Mg\ N_2\ O_6 . 6\ H_2\ O$. | 1.464. | | |
| [24] " " | " | | 143.° | 90.° |
| [25] Cadmium " | $Cd\ N_2\ O_6 . 4\ H_2\ O$. | | 132.° | 59°5. |
| [26] Mercurous " | $Hg\ N\ O_3 . H_2\ O$. | 4.785. m. of 3. | | |
| [27] Mercuric " | $Hg\ N_2\ O_6 . 8\ H_2\ O$. | | | 6°6. |
| [28] Glucinum " | $Gl\ N_2\ O_6 . 3\ H_2\ O$. | | 140°5. | 60.° |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lanthanum nitrate. | $La N_2 O_6 . 3 H_2 O$. | | 120.° | 40.° |
| [2] Chromium " | $Cr_2 O_3 . 3 N_2 O_5 . 18 H_2 O$. | | 125°5. | 37.° |
| [3] Iron " | $Fe_2 O_3 . 3 N_2 O_5 . 18 H_2 O$. | 1.6835, 21.° s. | 125.° | 47°2. |
| [4] " " | " | 1.6712. l. | | |
| [5] Aluminum " | $Al_2 O_3 . 3 N_2 O_5 . 18 H_2 O$. | | 134.° | 72°8. |
| [6] Uranium " | $U_2 O_3 . N_2 O_5 . 6 H_2 O$. | 2.807, 13.° | | |
| [7] " " | " | | 118.° | 59°5. |
| [8] " " | " | | | 120.° |
| [9] Bismuth " | $Bi N_3 O_9 . 5 H_2 O$. | 2.736. m. of 2. | | |

### 3d. BASIC AND AMMONIO NITRATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [10] Basic copper nitrate. | $3 Cu O . N_2 O_5 . H_2 O$. | 2.765. m. of 3. | | |
| [11] " mercury " | $2 Hg O . N_2 O_5 . 2 H_2 O$. | 4.242. | | |
| [12] " " " | $Hg_2 O . 4 Hg N O_3 . 3 H_2 O$. | 5.967. | | |
| [13] " lead " | $2 Pb O . N_2 O_5$. | 5.645. | | |
| [14] " bismuth " | $Bi_2 O_3 . N_2 O_5 . H_2 O$. | 4.551. | | |
| [15] " " " | $Bi_2 O_3 . N_2 O_5 . 2 H_2 O$. | 5.260. m. of 2. | | |
| [16] Copper ammonio-nitrate | $Cu N_2 O_6 . 4 N H_3$. | 1.874. m. of 3. | | |
| [17] Mercury " " | $2 Hg O . Hg N_2 O_6 . 2 N H_3$ | 5.970. | | |

## XXVIII. PHOSPHATES.

### 1st. ANHYDROUS ORTHOPHOSPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [18] Potassium dihydrogen phosphate. | $K H_2 P O_4$. | 2.298. | | |
| [19] " " " | " | 2.403. | | |
| [20] Ammonium dihydrogen phosphate. | $(N H_4) H_2 P O_4$. | 1.758. | | |
| [21] Diammonium hydrogen phosphate. | $(N H_4)_2 H P O_4$. | 1.619. | | |

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[20] Schiff. 25.
[21] Schiff. 25.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Diammonium hydrogen phosphate. | $(NH_4)_2\ H\ P\ O_4$. | 1.678. | | |
| [2] Trisilver phosphate. | $Ag_3\ P\ O_4$. | 7.300. | | |
| [3] Trithallium phosphate. | $Tl_3\ P\ O_4$. | 6.89, 10.° | | |
| [4] Thallium dihydrogen " | $Tl\ H_2\ P\ O_4$. | | | 190.° |
| [5] " " " | " | 4.723. | | |
| [6] Lead phosphate. | $Pb_3\ P_2\ O_8$. | 7.208. | | |
| [7] Xenotime. | $3\ Y\ O.\ P_2\ O_5$. | 4.557. | | |
| [8] " | " | 4.54. | | |
| [9] " | " | 4.45. | | |
| [10] " | " | 4.51. | | |
| [11] " | " | 4.39. Castelnaudite. | | |
| [12] Cryptolite. | $3\ Ce\ O.\ P_2\ O_5$. | 4.6. | | |
| [13] " | " | 4.78. Phosphocerite. | | |

## 2d. HYDRATED ORTHOPHOSPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [14] Trisodium phosphate. | $Na_3\ P\ O_4.\ 12\ H_2\ O$. | 1.622. | | |
| [15] " " | " | 1.618. | | |
| [16] " " | " | | | 77.° |
| [17] Disodium hydrogen phosphate. | $Na_2\ H\ P\ O_4.\ 12\ H_2\ O$. | 1.514. | | |
| [18] " " | " | 1.525. m. of 3. | | |
| [19] " " | " | | | 36?4. |
| [20] " " | " | 1.586, 8.° | | 35.° |
| [21] " " | " | 1.525, | | |
| [22] " " | " | 1.550. | | |
| [23] " " | " | 1.5235, 15.° | | |
| [24] Dihydrogen sodium phosphate. | $Na\ H_2\ P\ O_4.\ H_2\ O$. | 2.040. | | |
| [25] " " | | | | 204.° |
| [26] Triple phosphate. No. 1 | $NH_4.Na\ H\ P\ O_4.4\ H_2\ O$ | 1.554. | | |
| [27] " " | " | 1.6151. Stercorite. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Triple phosphate. No. 2. | $K\,Na\,H\,P\,O_4 . 7\,H_2\,O$. | 1.671. | | |
| [2] Dithallium hydrogen phosphate. | $2\,(Tl_2\,H\,P\,O_4) . H_2\,O$. | | | 145.° |
| [3] Brushite. | $Ca\,H\,P\,O_4 . 2\,H_2\,O$. | 2.208. | | |
| [4] " | " | 2.953–2.999. | | |
| [5] Metabrushite. | $2\,(Ca\,H\,P\,O_4) . 3\,H_2\,O$. | 2.288–2.362. | | |
| [6] " Zeugite. | " | 2.971–3.030. | | |
| [7] Struvite. | $N\,H_4\,Mg\,P\,O_4 . 6\,H_2\,O$. | 1.65. | | |
| [8] Vivianite. | $3\,Fe\,O . P_2\,O_5 . 3\,H_2\,O$. | 2.72. Fr. Kertsch. | | |
| [9] " | " | 2.58–2.68. | | |
| [10] Dufrenite. | $2\,Fe_2\,O_3 . P_2\,O_5 . 3\,H_2\,O$. | 3.227. | | |
| [11] " | " | 3.293. | | |
| [12] " | " | 3.874. | | |
| [13] " | " | 3.024. | | |
| [14] Cacoxenite. | $2\,Fe_2\,O_3 . P_2\,O_5 . 12\,H_2\,O$. | 3.38. | | |
| [15] Libethenite. | $Cu_3\,P_2\,O_8 . Cu\,H_2\,O_2$. | 3.6—3.8. | | |
| [16] Tagilite. | $Cu_3\,P_2\,O_8 . Cu\,H_2\,O_2 . 2\,H_2\,O$. | 4.076. | | |
| [17] " | " | 3.5, a. | | |
| [18] Ehlite. | $Cu_3\,P_2\,O_8 . 2\,Cu\,H_2\,O_2 . H_2\,O$. | 4.131—4.24. | | |
| [19] " | " | 4.07—4.198. | | |
| [20] Berlinite. | $4\,(Al\,P\,O_4) . H_2\,O$. | 2.64. | | |
| [21] Callainite. | $2\,(Al\,P\,O_4) . 5\,H_2\,O$. | 2.5—2.52. | | |
| [22] Augelite. | $2\,Al_2\,O_3 . P_2\,O_5 . 3\,H_2\,O$. | 2.77. | | |
| [23] Turquoise. | $2\,Al_2\,O_3 . P_2\,O_5 . 5\,H_2\,O$. | 2.426. Chalchihuite. | | |
| [24] " | " | 2.651. | | |
| [25] " | " | 2.621. | | |
| [26] Peganite. | $2\,Al_2\,O_3 . P_2\,O_5 . 6\,H_2\,O$. | 2.492–2.501. | | |
| [27] Fischerite. | $2\,Al_2\,O_3 . P_2\,O_5 . 8\,H_2\,O$. | 2.46. | | |
| [28] Sphaerite. | $5\,Al_2\,O_3 . 2\,P_2\,O_5 . 16\,H_2\,O$. | 2.536. | | |
| [29] Evansite. | $2Al_2O_3 . P_2O_5 . Al_2H_6O_6 . 15H_2O$ | 1.939. | | |
| [30] Trolleite. | $3\,Al\,P\,O_4 . Al\,H_3\,O_3$. | 3.10. | | |
| [31] Wavellite. | $3\,Al_2\,O_3 . 2\,P_2\,O_5 . 12\,H_2\,O$. | 2.337. | | |
| [32] " | " | 2.316. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Cirrolite. | $2Al_2O_3.6CaO.3P_2O_5.3H_2O$. | 3.08. | | |
| [2] Lazulite. | $2\,Al\,P\,O_4.\,Mg\,H_2\,O_2$. | 3.057. | | |
| [3] « | « | 3.067–3.121. | | |
| [4] « | « | 3.122. | | |
| [5] « | « | 3.108. | | |
| [6] Torbernite. | $2U_2O_3.P_2O_5.Cu\,H_2O_2.7\,H_2O$. | 3.329–3.372. | | |
| [7] « | | 3.4—3.6. | | |
| [8] Autunite. | $2U_2O_3.P_2O_5.Ca\,H_2O_2.7\,H_2O$. | 3.05—3.19. | | |

### 3d. PYROPHOSPHATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [9] Sodium pyrophosphate | $Na_4\,P_2\,O_7.\,10\,H_2\,O$. | 1.836. | | |
| [10] Silver « | $Ag_4\,P_2\,O_7$. | 5.306. | | |
| [11] Thallium « | $Tl_4\,P_2\,O_7$. | 6.786. | | |

## XXIX. Vanadates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [12] Dechenite. | | 5.81. | | |
| [13] « | | 5.83. | | |
| [14] Descloizite. | | 5.839. | | |

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## XXX. Arsenites and Arsenates.

### 1st. ANHYDROUS ARSENITES AND ARSENATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Lead arsenite. | $Pb\ As_2\ O_4$. | 5.85, 23.° | | |
| [2] Potassium dihydrogen arsenate. | $K\ H_2\ As\ O_4$. | 2.638. | | |
| [3] " " | " | 2.832. | | |
| [4] Ammonium " " | $N\ H_4.\ H_2\ As\ O_4$. | 2.249. | | |
| [5] Hydrogen diammonium arsenate. | $(N\ H_4)_2\ H\ As\ O_4$. | 1.989. | | |
| [6] Native nickel arsenate. | $5\ Ni\ O.\ As_2\ O_5$. | 4.838. | | |
| [7] " " " | $3\ Ni\ O.\ As_2\ O_5$. | 4.982. | | |

### 2d. HYDRATED ARSENATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [8] Sodium dihydrogen arsenate. | $Na\ H_2\ As\ O_4.\ H_2\ O$. | 2.535. | | |
| [9] Disodium hydrogen arsenate. | $Na_2\ H\ As\ O_4.\ 7\ H_2\ O$. | 1.871. | | |
| [10] " " " | $Na_2\ H\ As\ O_4.\ 12\ H_2\ O$. | 1.759. | | |
| [11] " " " | " | 1.736. | | |
| [12] " " " | " | 1.670. | | |
| [13] Trisodium arsenate. | $Na_3\ As\ O_4.\ 12\ H_2\ O$. | 1.804. m. of 2. | | |
| [14] " " | " | 1.762. | | |
| [15] Triple arsenate No. 1. | $N\ H_4.Na\ H\ As\ O_4.4\ H_2\ O$ | 1.838. | | |
| [16] " " No. 2. | $K\ Na\ H\ As\ O_4.\ 7\ H_2\ O$. | 1.884. | | |
| [17] Hoernesite. | $Mg_3\ As_2\ O_8.\ 8\ H_2\ O$. | 2.474. | | |
| [18] Erythrite. | $Co_3\ As_2\ O_8.\ 8\ H_2\ O$. | 2.948. | | |
| [19] Scorodite. | $Fe_2\ O_3.\ As_2\ O_5.\ 4\ H_2\ O$. | 3.11–3.18. | | |
| [20] Adamite. | $Zn_3\ As_2\ O_8.\ Zn\ H_2\ O_2$. | 4.338, 18.° | | |

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## XXXI. Antimonites and Antimonates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Romeite. | 3 Ca O. $Sb_2 O_3$. $Sb_2 O_5$. | 4.714. | | |
| [2] " | " | 4.675. | | |
| [3] Monimolite. | 4 Pb O. $Sb_2 O_5$. Impure. | 5.94. | | |
| [4] Bindheimite. | 3 Pb O. $Sb_2 O_5$. 4 $H_2$ O. | 4.6—4.76. | | |
| [5] " | " | 4.707. Brown. | | |
| [6] " | " | 5.05. White. | | |

## XXXII. Carbonates.

### 1st. ANHYDROUS SIMPLE CARBONATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [7] Lithium carbonate. | $Li_2$ C $O_3$. | 2.111. | | |
| [8] Sodium " | $Na_2$ C $O_3$. | 2.4659. | | |
| [9] " " | " | 2.430. | | |
| [10] " " | " | 2.509. | | |
| [11] Potassium " | $K_2$ C $O_3$ | 2.2643. | | |
| [12] " " | " | 2.103. | | |
| [13] " " | " | 2.267. | | |
| [14] Silver " | $Ag_2$ C $O_3$. | 6.0766. | | |
| [15] " " | " | 6.0, 17°5. | | |
| [16] Thallium " | $Tl_2$ C $O_3$. | 7.06. | | |
| [17] " " | " | 7.164. | | |
| [18] Calcium " | Ca C $O_3$. | 2.7000. | | |
| [19] " " | " | 2.6946. Chalk. | | |
| [20] Arragonite. | " | 2.931. | | |
| [21] " | " | 2.927. | | |
| [22] " | " | 2.945–2.947. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Arragonite. | Ca C $O_3$. | 2.931. | | |
| [2] | " | " | 2.938–2.995. | | |
| [3] | " | " | 2.933, 0.° | | |
| [4] | " | " | 2.93. | | |
| [5] | " | " | 2.92. | | |
| [6] | " | " | 2.72–2.95. | | |
| [7] | " | " | 2.93. | | |
| [8] | " | " | 2.884. Mossottite. | | |
| [9] | " | " | 2.932. | | |
| [10] | Calcite. | " | 2.7064. | | |
| [11] | " | " | 2.6987. | | |
| [12] | " | " | 2.7213. | | |
| [13] | " | " | 2.7234. | | |
| [14] | " | " | 2.815. Fr. Stirling, N. J. | | |
| [15] | " | " | 2.702. Cryst. | | |
| [16] | " | " | 2.943. m. of 6. | | |
| [17] | " | " | 2.72. | | |
| [18] | Strontium carbonate. | Sr C $O_3$. | 3.605. | | |
| [19] | " " | " | 3.6245. | | |
| [20] | " " | " | 3.613. | | |
| [21] | " " | " | 3.548. Precipitated. | | |
| [22] | " " | " | 3.620. Precipitated. | | |
| [23] | Barium " | Ba C $O_3$. | 4.24. | | |
| [24] | " " | " | 4.301. | | |
| [25] | " " | " | 4.35. | | |
| [26] | " " | " | 4.3019. | | |
| [27] | " " | " | 4.565. | | |
| [28] | " " | " | 4.216. Precipitated. | | |
| [29] | " " | " | 4.235. Precipitated. | | |
| [30] | " " | " | 4.373. Precipitated. | | |
| [31] | Lead " | Pb C $O_3$. | 6.465. | | |
| [32] | " " | " | 6.5. | | |
| [33] | " " | " | 6.47. | | |
| [34] | " " | " | 6.4277. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Lead carbonate. | $PbCO_3$. | 6.60. Fr. Phœnixville. | | |
| [2] | Manganese carbonate. | $MnCO_3$. | 3.59. | | |
| [3] | " " | " | 3.553. | | |
| [4] | " " | " | 3.6608. | | |
| [5] | " " | " | 3.57. | | |
| [6] | " " | " | 3.129. } Precipitated. | | |
| [7] | " " | " | 3.122. } | | |
| [8] | Iron " | $FeCO_3$. | 3.829. | | |
| [9] | " " | " | 3.872. | | |
| [10] | " " | " | 3.815. Impure. | | |
| [11] | " " | " | 3.796, 0.° | | |
| [12] | " " | " | 3.698. | | |
| [13] | Zinc " | $ZnCO_3$. | 4.339. | | |
| [14] | " " | " | 4.442. | | |
| [15] | " " | " | 4.3765. | | |
| [16] | " " | " | 4.45. | | |
| [17] | " " | " | 4.45. | | |
| [18] | " " | " | 4.42. | | |
| [19] | Cadmium " | $CdCO_3$. | 4.42, 17.° | | |
| [20] | " " | " | 4.4938. | | |
| [21] | Magnesium " | $MgCO_3$. | 3.033. | | |
| [22] | " " | " | 2.81. | | |
| [23] | " " | " | 2.925. | | |
| [24] | " " | " | 3.056. | | |
| [25] | " " | " | 3.065. | | |
| [26] | " " | " | 3.017. | | |
| [27] | " " | " | 3.017. | | |
| [28] | " " | " | 3.007–3.076. | | |
| [29] | " " | " | 3.033. | | |
| [30] | " " | " | 3.015. | | |

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## 2d. HYDRATED SIMPLE CARBONATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium carbonate. | $Na_2 C O_3 . H_2 O$. | 1.5–1.6. Thermonatrite | | |
| [2] " " | $Na_2 C O_3 . 8 H_2 O$. | 1.51. | | |
| [3] " " | $Na_2 C O_3 . 10 H_2 O$. | 1.423. | | |
| [4] " " | " | 1.454, m. of 4. | | |
| [5] " " | " | 1.475. | | |
| [6] " " | " | 1.463. | | |
| [7] " " | " | 1.4402. | | |
| [8] Trona. | $2Na_2O.3CO_2.4H_2O$ | 2.11. | | |
| [9] Calcium carbonate. | $Ca C O_3 . 5 H_2 O$. | 1.783. | | |
| [10] " " | " | 1.75. | | |
| [11] Lanthanite. | $La C O_3 . 3 H_2 O$. | 2.605, 20.° | | |
| [12] " | " | 2.666. | | |

## 3d. ANHYDROUS DOUBLE CARBONATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Hydrogen sodium carbonate. | $H Na C O_3$. | 2.192. m. of 2. | | |
| [14] " " " | " | 2.163. | | |
| [15] " " " | " | 2.2208, 15.° | | |
| [16] " potassium " | $H K C O_3$. | 2.012. | | |
| [17] " " " | " | 2.092. | | |
| [18] " " " | " | 2.180. | | |
| [19] " ammonium " | $H N H_4 . C O_3$. | 1.586. | | |
| [20] Sodium potassium " | $K Na C O_3$. | 2.5289. | | |
| [21] " " " | " | 2.5633. | | |
| [22] Uranium ammonium carbonate. | $U_2CO_5.2((NH_4)_2CO_3)$ | 2.7725, 9.° | | |

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[21] Stolba. 18. 166.
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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Bromlite. | $Ca\,C\,O_3 . Ba\,C\,O_3$. | 3.718. | | |
| [2] " | " | 3.76, 15°5. | | |
| [3] " Barytocalcite. | " | 3.66. | | |
| [4] Manganocalcite. | $Ca\,C\,O_3 . 2\,Mn\,C\,O_3$. | 3.037. | | |
| [5] Dolomite. | $Ca\,C\,O_3 . Mg\,C\,O_3$. | 2.72. | | |
| [6] " | " | 2.845. | | |
| [7] " Impure. | " | 2.629. | | |
| [8] " " | " | 2.856. | | |
| [9] " " | " | 2.89. | | |
| [10] " " | " | 2.924. | | |
| [11] " " | " | 2.85. | | |
| [12] Mesitite. | $2\,Mg\,C\,O_3 . Fe\,C\,O_3$. | 3.349—3.363. | | |
| [13] Pistomesite. | $Mg\,C\,O_3 . Fe\,C\,O_3$. | 3.412—3.417. | | |
| [14] " | " | 3.427. | | |
| [15] " | " | 3.41. | | |

## 4th. BASIC CARBONATES, AND HYDRATED DOUBLE CARBONATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [16] Sodium potassium carbonate. | $K\,Na\,C\,O_3 . 12\,H_2\,O$. | 1.6088. | | |
| [17] " " " | " | 1.6334. } 14. | | |
| [18] Gay-Lussite. | $Na_2\,C\,O_3 . Ca\,C\,O_3 . 5\,H_2O$. | 1.928–1.950. | | |
| [19] Hydrodolomite. | $Ca\,C\,O_3 . 2\,Mg\,C\,O_3 . H_2\,O$. | 2.495. | | |
| [20] " Pennite. | " | 2.86. | | |
| [21] Pencatite. | $Ca\,C\,O_3 . Mg\,H_2\,O_2$. | 2.613. | | |
| [22] " | " | 2.57. | | |
| [23] Predazzite. | $2\,Ca\,C\,O_3 . Mg\,H_2\,O_2$. | 2.634. | | |
| [24] Hydromagnesite. | $3MgCO_3 . MgH_2O_2 . 3H_2O$ | 2.145–2.180. | | |
| [25] Zaratite. | $NiCO_3 . 2NiH_2O_2 . 4H_2O$. | 2.57—2.693. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Malachite. | $Cu\ C\ O_3 . Cu\ H_2\ O_2$. | 3.715. | | |
| [2] « | « | 3.898. | | |
| [3] « | « | 4.06. } Fr. Phœnixville. | | |
| [4] Azurite. | $2\ Cu\ C\ O_3 . Cu\ H_2\ O_2$. | 3.88. } | | |
| [5] Hydrozincite. | $Zn\ C\ O_3 . 2\ Zn\ H_2\ O_2$. | 3.252. | | |

## XXXIII. Silicates.

### 1st. ANHYDROUS SILICATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [6] Wollastonite. | $Ca\ Si\ O_3$. | 2.785–2.895. | | |
| [7] « | « | 2.805. | | |
| [8] Rhodonite. | $Mn\ Si\ O_3$. | 3.63. | | |
| [9] « | « | 3.63. | | |
| [10] Grünerite. | $Fe\ Si\ O_3$. | 3.713. | | |
| [11] Enstatite. | $Mg\ Si\ O_3$. | 3.1—3.13. | | |
| [12] « Kupfferite. | « | 3.08. | | |
| [13] « | « | 3.11. Artif. cryst. | | |
| [14] Tephroite. | $Mn_2\ Si\ O_4$. | 4.1. | | |
| [15] « | | 4.0. | | |
| [16] Fayalite. | $Fe_2\ Si\ O_4$. | 4.138. From Fayal. | | |
| [17] « | « | 4.006. « Ireland. | | |
| [18] Willemite. | $Zn_2\ Si\ O_4$. | 3.89–4.0. | | |
| [19] « | « | 4.154. | | |
| [20] « | « | 3.935. | | |
| [21] « | « | 4.16–4.18. | | |
| [22] « | « | 4.18. Fr. Stolberg. } | | |
| [23] « | « | 4.02–4.16. } | | |
| [24] « | « | 4.02. | | |
| [25] « | « | 4.11–4.16. | | |
| [26] Forsterite. | $Mg_2\ Si\ O_4$. | 3.243. | | |

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[26] Rammelsberg. 13. 757.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Forsterite. Boltonite. | $Mg_2 Si O_4$. | 3.21. | | |
| [2] | " " | " | 3.008. | | |
| [3] | " " | " | 2.208–3.328. | | |
| [4] | Phenacite. | $Gl_2 Si O_4$. | 2.966–2.996. | | |
| [5] | Andalusite. | $Al_2 O_3 . Si O_2$. | 3.154. | | |
| [6] | " | " | 3.103. | | |
| [7] | " | " | 3.070. Fr. Ireland. | | |
| [8] | " Fibrolite. | " | 3.24. | | |
| [9] | " " | " | 3.18–3.21. | | |
| [10] | " Bucholzite. | " | 3.239. | | |
| [11] | " Monrolite. | " | 3.04–3.1. | | |
| [12] | " " | " | 3.075. | | |
| [13] | " Sillimanite. | " | 3.238. | | |
| [14] | " " | " | 3.232. | | |
| [15] | " " | " | 3.239. | | |
| [16] | " Cyanite. | " | 3.48. | | |
| [17] | " " | " | 3.6. | | |
| [18] | " " | " | 3.661. | | |
| [19] | " " | " | 3.678. | | |
| [20] | Zircon. | $Zr O_2 . Si O_2$. | 4.072–4.681. | | |
| [21] | " | " | 4.721. | | |
| [22] | " | " | 4.615–4.710. | | |
| [23] | " | " | 4.7. From Litchfield. | | |
| [24] | " | " | 4.047. | | |
| [25] | " | " | 4.2. From Brevig. | | |
| [26] | " | " | 4.595. " Reading, Pa. | | |
| [27] | " | " | 4.602–4.625, Canadian. | | |
| [28] | " | " | 4.56–4.61. | | |
| [29] | " | " | 4.395, before heating. | | |
| [30] | " | " | 4.515, before heating. | | |
| [31] | " | " | 4.438, after heating. | | |
| [32] | " | " | 4.863, after heating. | | |

Extremes of six, from different localities.

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## 2d. HYDRATED SILICATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Okenite. | $Ca\,O.\,2\,Si\,O_2.\,2\,H_2\,O.$ | 2.28. | | |
| [2] " | " | 2.362. Dysclasite. | | |
| [3] " | " | 2.324. | | |
| [4] Dioptase. | $Cu\,Si\,O_3.\,H_2\,O.$ | 3.314–3.348. | | |
| [5] Chrysocolla. | $Cu\,Si\,O_3.\,2\,H_2\,O.$ | 2.0–2.238. | | |
| [6] Picrosmine. | $2\,Mg\,Si\,O_3.\,H_2\,O.$ | 2.66. Massive. | | |
| [7] " | " | 2.596. Columnar. | | |
| [8] Talc. | $6\,Mg\,O.5\,Si\,O_2.2\,H_2O.$ | 2.565–2.8. | | |
| [9] Serpentine. | $3\,Mg\,O.2\,Si\,O_2.2\,H_2O.$ | 2.557. Picrolite. | | |
| [10] " | " | 2.644. | | |
| [11] " | " | 2.219. Chrysotile. | | |
| [12] " | " | 2.6–2.65. " | | |
| [13] " | " | 2.57. | | |
| [14] Deweylite. | $2\,Mg\,O.3\,Si\,O_2\,5\,H_2O.$ | 2.246. | | |
| [15] " | " | 2.19–2.31. | | |
| [16] " | " | 2.216. | | |
| [17] " | " | 1.936–2.155. | | |
| [18] Calamine. | $2\,Zn\,O.\,Si\,O_2.\,H_2\,O.$ | 3.16–3.9. | | |
| [19] Thorite. | $3\,Th\,Si\,O_3.\,4\,H_2\,O.$ | 4.630. | | |
| [20] " | " | 4.686. | | |
| [21] " | " | 4.344–4.397. | | |
| [22] " Orangite. | " | 5.34–5.397. | | |
| [23] " " | " | 5.19. | | |
| [24] " " | " | 5.397. | | |
| [25] " " | " | 4.888–5.205. { Extremes of seven. | | |

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## XXXIV. Stannates and Titanates.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Calcium titanate. | $Ca\ Ti\ O_3$. | 4.10. Artif. cryst. | | |
| [2] " " | " | 4.00. " " | | |
| [3] " " | " | 4.03–4.039. Perofskite. | | |
| [4] Magnesium titanate. | $Mg\ Ti\ O_3$. | 3.91. Artif. cryst. | | |
| [5] Di magnesium " | $Mg_2\ Ti\ O_4$. | 3.52. " " | | |
| [6] Di-iron " | $Fe_2\ Ti\ O_4$. | 4.37. " " | | |
| [7] Potassium stannate. | $K_2 Sn O_3 . 3 H_2 O$. | 3.197. | | |

## XXXV. Silicofluorides.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [8] Lithium silicofluoride. | $2\ Li\ F . Si\ F_4 . 2\ H_2 O$. | 2.33. | | |
| [9] Sodium " | $2\ Na\ F . Si\ F_4$. | 2.7547, 17°5. | | |
| [10] Potassium " | $2\ K\ F . Si\ F_4$. | 2.6655. } 17°5. | | |
| [11] " " | " | 2.6649. } | | |
| [12] Rubidium " | $2\ Rb\ F . Si\ F_4$. | 3.3383, 20.° | | |
| [13] Cæsium " | $2\ Cs\ F . Si\ F_4$. | 3.3756, 17.° | | |
| [14] Barium " | $Ba\ F_2 . Si\ F_4$. | 4.2794, 21.° | | |
| [15] Copper " | $2(CuF_2 . SiF_4 .) . 13 H_2 O$ | 2.1576, 19.° | | |

## XXXVI. Cyanides and Cyanates.

### 1st. SIMPLE CYANIDES AND CYANATES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [16] Potassium cyanide. | K Cy. | 1.52, 12.° | | |
| [17] Ammonium " | $N\ H_4$ Cy. | | 36.° | |
| [18] Silver " | Ag Cy. | 3.943, 11.° | | |
| [19] Mercury " | $Hg\ Cy_2$. | 3.77, 13.° | | |
| [20] Phosphorus " | $P\ Cy_3$. | | | 200°–203.° |
| [21] Potassium cyanate. | K Cy O. | 2.0475, 16.° | | |
| [22] Silver " | Ag Cy O. | 4.004, 16.° | | |

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[13] Preis. 21. 195.
[14] Stolba. 18. 170.
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## 2d. COMPOUND CYANIDES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sodium ferrocyanide. | $Na_4 Cy_6 Fe. 12 H_2 O.$ | 1.458. | | |
| [2] Potassium « | $K_4 Cy_6 Fe. 3 H_2 O.$ | 1.83. | | |
| [3] « « | « | 1.86. | | |
| [4] « « | « | 2.052. | | |
| [5] Thallium « | $Tl_4 Cy_6 Fe. 2 H_2 O.$ | 4.641. | | |
| [6] Potassium ferricyanide | $K_3 Cy_6 Fe.$ | 1.8004. | | |
| [7] « « | « | 1.845. | | |
| [8] « « | « | 1.849. | | |
| [9] « « | « | 1.817. | | |
| [10] « cobalticyanide. | $K_3 Cy_6 Co.$ | 1.906, 11.° | | |
| [11] Barium platinocyanide | $Ba Cy_4 Pt.$ | 3.054. | | |
| [12] Potassium sulphocyanide. | K Cy S. | 1.866. } 14.° | | |
| [13] « « | « | 1.906. } | | |
| [14] « « | « | | | 161°2. |
| [15] Lead « | $Pb Cy_2 S_2.$ | 3.82. | | |
| [16] Titanium nitrocyanide | $Ti Cy_2. 3 Ti_3 N_2.$ | 5.30. | | |
| [17] « « | « | 5.28001. | | |

## XXXVII. Miscellaneous Inorganic Compounds.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [18] Cyanogen. l. | N C. | .866, 17°2. | | —34°5. |
| [19] Ammonia. l. | $N H_3.$ | .731, 15°5. | | —75.° |
| [20] « l. | « | .6234, 0.° m. of 3. | | |
| [21] « l. | « | .6492,—10.° | | |
| [22] « l. | « | .6429,—5.° | | |
| [23] « l. | « | .6364, 0.° | | |
| [24] « l. | « | .6298, 5.° | | |
| [25] « l. | « | .6230, 10.° | | |
| [26] « l. | « | .6160, 15.° | | |
| [27] « l. | « | .6089, 20.° | | |

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[20] Jolly. 14. 165.
[21] [22] [23] [24] [25] [26] [27] D'Andreéff. 22.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Nitrogen chlorophosphide. | $P_3 N_3 Cl_6$. | | (a. 240.) | 110. |
| [2] " " | " | 1.98. | | |
| [3] Cryst. Titanium compound. | $3 Ti O_2 . P_2 O_5$. | 2.9. | | |
| [4] Potassium chlorochromate. | $K Cl . Cr O_3$. | 2.466. | | |
| [5] " " | " | 2.49702, 4.° | | |
| [6] Sodium fluo-phosphate | $Na_3 P O_4 . Na F . 12 H_2 O$. | 2.2165, 25.° | | |
| [7] " fluo-arsenate. | $Na_3 As O_4 . Na F . 12 H_2 O$. | 2.849, 25.° | | |
| [8] Potassium fluoborate. | $K B F_4$. | 2.5–2.6. | | |
| [9] Potassium nitro-sulphate. | $K_2 S O_4 . H N O_3$. | 2.38. | | 150.° |
| [10] Potassium phosphato-sulphate. | $K_2 S O_4 . H_3 P O_4$. | 2.296. | | 240.° |
| [11] Sphene. | $Ca O . Si O_2 . Ti O_2$. | 3.45. Artif. cryst. | | |
| [12] " | " | 3.49–3.51. | | |
| [13] " Guarinite. | " | 3.487. | | |
| [14] Leadhillite. | $Pb S O_4 . 3 Pb C O_3$. | 6.550. | | |
| [15] " | " | 6.526. | | |
| [16] " Susannite. | " | 6.5–6.55. | | |
| [17] Lanarkite. | $Pb S O_4 . Pb C O_3$. | 6.3–6.4. | | |
| [18] Phosgenite. | $Pb C O_3 . Pb Cl_2$. | 6.0–6.31. | | |
| [19] Wagnerite. | $Mg_3 P_2 O_8 . Mg F_2$. | 3.068–2.985. | | |
| [20] Apatite. | $3 Ca_3 P_2 O_8 . Ca Cl_2$. | 3.054. Artif. cryst. | | |
| [21] " | " | 3.565. | | |
| [22] " | " | 3.234. | | |
| [23] " | " | 3.20. | | |
| [24] " | " | 3.091. } Extremes of seven determinations. | | |
| [25] " | " | 3.216. } | | |
| [26] Pyromorphite. | $3 Pb_3 P_2 O_8 . Pb Cl_2$. | 7.008. Artif. cryst. | | |
| [27] " | " | 7.1. | | |
| [28] " | " | 6.94. | | |
| [29] " | " | 7.36. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Mimetite. | $3\ Pb_3\ As_2\ O_8.\ Pb\ Cl_2.$ | 7.218. | | |
| [2] « | « | 7.32. | | |
| [3] Boracite. | $6\ Mg\ O.8\ B_2O_3.Mg\ Cl_2$ | 2.974. | | |
| [4] « | « | 2.9134. | | |
| [5] Vanadinite. | $3\ Pb_3\ V_2\ O_8.\ Pb\ Cl_2.$ | 6.886. Carinthian. | | |
| [6] « | « | 6.863. Siberian. | | |
| [7] « | « | 6.707 .12.° Artif. | | |

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## XXXVIII. Alloys.

For the following table completeness is not claimed. The compiler has merely sought to tabulate the more important published determinations of the Specific Gravities and Melting Points of Alloys, including only those alloys whose composition admits of moderately simple formulas. Some of these substances are, doubtless, definite chemical compounds; but the formulas, in most cases, merely indicate the proportions of the metals in the alloys.

### 1st. ALLOYS CONTAINING BUT TWO METALS.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| Silver and Lead. | | |
| [1] $Ag_4$ Pb. | 10.800, 13°5. | |
| [2] $Ag_2$ Pb. | 10.925, 13°8. | |
| [3] Ag Pb. | 11.054, 12°5. | |
| [4] Ag $Pb_2$. | 11.144, 18°2 | |
| [5] Ag $Pb_4$. | 11.196, 21.° | |
| [6] Ag $Pb_{10}$. | 11.285, 22°2. | |
| [7] Ag $Pb_{25}$. | 11.334, 20°6. | |
| Copper and Lead. | | |
| [8] Cu Pb. | 10.375. | |
| [9] $Cu_2$ $Pb_3$. | 10.753. | |
| Iridium and Osmium. | | |
| [10] Ir Os. Newjanskite. | 19.386—19.471. | |
| [11] Ir $Os_4$. Sisserskite. | 21.118. | |
| Silver and Copper. | | |
| [12] $Ag_3$ $Cu_2$. | 9.9045. | |
| Copper and Zinc. | | |
| [13] $Cu_{10}$ Zn. | 8.605. | |
| [14] $Cu_9$ Zn. | 8.607. | |
| [15] $Cu_8$ Zn. | 8.633. | |
| [16] $Cu_7$ Zn. | 8.587. | |
| [17] $Cu^6$ Zn. | 8.591. | |
| [18] $Cu_5$ Zn. | 8.415. | |
| [19] " | 8.673. | |

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| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Cu_4$ Zn. | 8.448. | |
| [2] " | 8.650. | |
| [3] $Cu_3$ Zn. | 8.397. | |
| [4] " | 8.576. | |
| [5] $Cu_2$ Zn. | 8.299. | |
| [6] " | 8.392. | |
| [7] " | 8.488. | |
| [8] $Cu_3$ $Zn_2$. | 8.224. | |
| [9] Cu Zn. | 8.230. | |
| [10] " | 7.808. | |
| [11] $Cu_3$ $Zn_5$. | 7.939. | |
| [12] Cu $Zn_2$. | 8.283. | |
| [13] " | 7.859. | |
| [14] $Cu_8$ $Zn_{17}$. | 7.721. | |
| [15] $Cu_8$ $Zn_{18}$. | 7.836. | |
| [16] $Cu_8$ $Zn_{19}$. | 8.019. | |
| [17] $Cu_8$ $Zn_{20}$. | 7.603. | |
| [18] $Cu_8$ $Zn_{21}$. | 8.058. | |
| [19] $Cu_8$ $Zn_{22}$. | 7.882. | |
| [20] $Cu_8$ $Zn_{23}$. | 7.443. | |
| [21] Cu $Zn_3$. | 7.449. | |
| [22] " | 7.736. | |
| [23] Cu $Zn_4$. | 7.371. | |
| [24] " | 7.445. | |
| [25] Cu $Zn_5$. | 6.605. | |
| [26] " | 7.442. | |
| CADMIUM AND LEAD. | | |
| [27] $Cd_6$ Pb. | 9.160, 13°7. | |
| [28] $Cd_4$ Pb. | 9.353, 12.° | |
| [29] $Cd_2$ Pb. | 9.755, 14°7. | |
| [30] Cd Pb. | 10.246, 11°7. | |
| [31] Cd $Pb_2$. | 10.656, 13°4. | |
| [32] Cd $Pb_4$. | 10.950, 9°2. | |
| [33] Cd $Pb_6$. | 11.044, 14°8. | |

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[33] Holzmann. P. T. 1860. 177.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| LEAD AND ANTIMONY. | | |
| [1] $Sb_7$ Pb. | 7.214. | |
| [2] $Sb_6$ Pb. | 7.361. | |
| [3] $Sb_5$ Pb. | 7.432. | |
| [4] $Sb_4$ Pb. | 7.525. | |
| [5] " | 7.622. | |
| [6] $Sb_3$ Pb. | 7.830. | |
| [7] $Sb_2$ Pb. | 8.330. | |
| [8] " | 8.201, 13°7. | |
| [9] " | 8.233. | |
| [10] Sb Pb. | 8.953. | |
| [11] " | 8.989, 11°7. | |
| [12] " | 8.999. | |
| [13] $Sb_2$ $Pb_3$. | 9.502. | |
| [14] Sb $Pb_2$. | 9.723. | |
| [15] " | 9.811, 14°3. | |
| [16] " | 9.817. | |
| [17] $Sb_2$ $Pb_5$. | 10.040. | |
| [18] Sb $Pb_3$. | 10.136. | |
| [19] " | 10.144, 15°4. | |
| [20] " | 10.211. | |
| [21] $Sb_2$ $Pb_7$. | 10.344. | |
| [22] Sb $Pb_4$. | 10.387. | |
| [23] " | 10.455. | |
| [24] $Sb_2$ $Pb_9$. | 10.541. | |
| [25] Sb $Pb_5$. | 10.556. | |
| [26] " | 10.586, 19°3. | |
| [27] " | 10.615. | |
| [28] $Sb_2$ $Pb_{11}$. | 10.673. | |
| [29] Sb $Pb_6$. | 10.722. | |
| [30] $Sb_2$ $Pb_{13}$. | 10.764. | |
| [31] Sb $Pb_7$. | 10.802. | |
| [32] Sb $Pb_{10}$+ | 10.930, 19°9. | |
| [33] Sb $Pb_{25}$. | 11.194, 20°5. | |

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[33] Matthiessen. P. T. 1860. 177.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| COPPER AND ANTIMONY. | | |
| [1] Cu Sb | 7.990. | |
| BISMUTH AND SILVER. | | |
| [2] $Bi_{200}$ Ag. | 9.802, 23°5. | |
| [3] $Bi_{30}$ Ag. | 9.813, 23°6. | |
| [4] $Bi_{24}$ Ag. | 9.820, 23°3. | |
| [5] $Bi_{12}$ Ag. | 9.836, 21°8. | |
| [6] $Bi_{6}$ Ag. | 9.859, 21.° | |
| [7] $Bi_{4}$ Ag. | 9.899, 15°2. | |
| [8] $Bi_{2}$ Ag. | 9.966, 14°9. | |
| [9] Bi Ag. | 10.068, 15°6. | |
| [10] Bi $Ag_2$. | 10.197, 13°2. | |
| [11] Bi $Ag_4$. | 10.323, 15°1. | |
| BISMUTH AND LEAD. | | |
| [12] $Bi_{60}$ Pb. | 9.844, 21°7. | |
| [13] $Bi_{48}$ Pb. | 9.845, 21°6. | |
| [14] $Bi_{40}$ Pb. | 9.850, 21°3. | |
| [15] $Bi_{24}$ Pb. | 9.887, 20°6. | |
| [16] $Bi_{20}$ Pb. | 9.893, 19°5. | |
| [17] $Bi_{16}$ Pb. | 9.934, 21°1. | |
| [18] $Bi_{12}$ Pb. | 9.973, 15.° | |
| [19] $Bi_{8}$ Pb. | 10.048, 10°7. | |
| [20] $Bi_{4}$ Pb. | 10.235, 12°5. | |
| [21] " | 10.232. | |
| [22] $Bi_{3}$ Pb. | | 122°4. |
| [23] $Bi_{8}$ $Pb_3$. | | 125°3. |
| [24] $Bi_{2}$ Pb. | 10.538, 14.° | |
| [25] " | 10.519. | |
| [26] Bi Pb. | 10.956, 14°9. | |
| [27] " | 10.931. | |
| [28] $Bi_{4}$ $Pb_5$. | 11.038. | |
| [29] $Bi_{2}$ $Pb_3$. | 11.108. | |
| [30] $Bi_{4}$ $Pb_7$. | 11.166. | |
| [31] Bi $Pb_2$. | 11.141, 12°7. | |

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[29] Riche. 15. 111.
[30] Riche. 15. 111.
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| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Bi\ Pb_2$. | 11.194. | |
| [2] $Bi_2\ Pb_5$. | 11.209. | |
| [3] $Bi\ Pb_3$. | 11.161, 14°8. | |
| [4] " | 11.225. | |
| [5] $Bi_2\ Pb_7$. | 11.235. | |
| [6] $Bi\ Pb_4$. | 11.188, 20°8. | |
| [7] $Bi\ Pb_5$. | 11.196, 20°2. | |
| [8] $Bi\ Pb_{12}$. | 11.280, 22°5. | |
| [9] $Bi\ Pb_{50}$. | 11.331, 23.° | |
| BISMUTH AND COPPER. | | |
| [10] Bi Cu. | 9.634. | |
| BISMUTH AND ZINC. | | |
| [11] Bi Zn. | 9.046. | |
| BISMUTH AND CADMIUM. | | |
| [12] $Bi_{12}$ Cd. | 9.766, 15°4. | |
| [13] $Bi_8$ Cd. | 9.737, 14°7. | |
| [14] $Bi_4$ Cd. | 9.669, 14°8. | |
| [15] $Bi_2$ Cd. | | 146°3. |
| [16] " | 9.554, 13°4. | |
| [17] Bi Cd. | 9.388, 15.° | |
| [18] Bi $Cd_2$. | 9.195, 15°5. | |
| [19] Bi $Cd_3$. | 9.079, 13°1. | |
| BISMUTH AND ANTIMONY. | | |
| [20] $Bi_6$ Sb. | 9.435, 9°4. | |
| [21] $Bi_5$ Sb. | 9.369. | |
| [22] $Bi_4$ Sb. | 9.276. | |
| [23] " | 9.277, 12°1. | |
| [24] $Bi_3$ Sb. | 9.095. | |
| [25] $Bi_2$ Sb. | 8.859. | |
| [26] " | 8.886, 14.° | |
| [27] Bi Sb. | 8.392, 11.° | |
| [28] " | 8.364. | |
| [29] Bi $Sb_2$. | 7.829. | |
| [30] " | 7.864, 9°4. | |

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| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Bi\ Sb_3$. | 7.561. | |
| [2] $Bi\ Sb_4$. | 7.370. | |
| [3] $Bi\ Sb_5$. | 7.271. | |
| GOLD AND SILVER. | | |
| [4] $Ag_8\ Au$. | 11.760, 13°1. | |
| [5] $Ag_4\ Au$. | 12.257, 14°7. | |
| [6] $Ag_2\ Au$. | 13.432, 14°3. | |
| [7] $Ag\ Au$. | 14.870, 13.° | |
| [8] $Ag\ Au_2$. | 16.354, 13.° | |
| [9] $Ag\ Au_4$. | 17.540, 12°3. | |
| [10] $Ag\ Au_6$. | 18.041, 13°1. | |
| GOLD AND LEAD. | | |
| [11] $Pb_{10}\ Au$. | 11.841, 23°3. | |
| [12] $Pb_5\ Au$. | 12.274, 19°4. | |
| [13] $Pb_4\ Au$. | 12.445, 21°6. | |
| [14] $Pb_3\ Au$. | 12.737, 21°3. | |
| [15] $Pb_2\ Au$. | 13.306, 22°1. | |
| [16] $Pb\ Au$. | 14.466, 14°3. | |
| [17] $Pb\ Au_2$. | 15.693, 14°5. | |
| [18] $Pb\ Au_4$. | 17.013, 14°3. | |
| GOLD AND BISMUTH. | | |
| [19] $Bi_{90}\ Au$. | 9.872, 21.° | |
| [20] $Bi_{40}\ Au$. | 9.942, 21°2. | |
| [21] $Bi_{20}\ Au$. | 10.076, 18°7. | |
| [22] $Bi_8\ Au$. | 10.452, 21°4. | |
| [23] $Bi_4\ Au$. | 11.025, 23.° | |
| [24] $Bi_2\ Au$. | 12.067, 16.° | |
| [25] $Bi\ Au$. | 13.403, 16°5. | |
| [26] $Bi\ Au_2$. | 14.844, 16.° | |
| TIN AND SILVER. | | |
| [27] $Sn_{18}\ Ag+$. | 7.421, 18°6. | |
| [28] $Sn_5\ Ag$. | 7.551, 18°8. | |
| [29] $Sn_6\ Ag+$. | 7.666, 18°4. | |
| [30] $Sn_3\ Ag+$. | 7.963, 19°3. | |

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[30] Holzmann. P.T.1860.177.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Sn_2 Ag_+$. | 8.223, 16°3. | |
| [2] Sn Ag. | 8.828, 13°8. | |
| [3] $Sn Ag_2$. | 9.507, 12°9. | |
| [4] $Sn Ag_4$. | 9.953. 14°8. | |
| TIN AND LEAD. | | |
| [5] $Sn_6 Pb$. | 7.9210. | |
| [6] " | 7.927, 15°2. | |
| [7] $Sn_5 Pb$. | 8.0279. | 194.° |
| [8] " | 8.093. | |
| [9] " | 8.046. | |
| [10] $Sn_4 Pb$. | 8.1730. | 189.° |
| [11] " | 7.850. | 190.° |
| [12] " | 8.188, 16.° | |
| [13] " | 8.196. | |
| [14] " | 8.2347. | 187.° |
| [15] " | 8.195. | |
| [16] $Sn_3 Pb$. | 8.3914. | 186.° |
| [17] " | 8.549. | 182°8. |
| [18] " | | 182°5. |
| [19] " | | 182°8. |
| [20] " | 9.025. | |
| [21] " | 8.418. | |
| [22] " | 8.4087. | 181.° |
| [23] " | 8.414. | |
| [24] $Sn_7 Pb_2$. | 8.291. | |
| [25] $Sn_5 Pb_2$. | 8.565. | |
| [26] $Sn_2 Pb$. | 8.7454. | 196.° |
| [27] " | 8.688. | 182°8. |
| [28] " | 8.779, 17°2. | |
| [29] " | 8.774. | |
| [30] " | 8.7257. | 197.° |
| [31] " | 8.766. | |
| [32] $Sn_3 Pb_2$. | 9.0377. | 210.° |
| [33] " | 9.046. | |

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[30] Pillichody. 14. 279.
[31] Riche. 15. 111.
[32] Pillichody. 14. 279.
[33] Riche. 15. 111.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Sn_7 Pb_5$. | 9.2773, 15.° | 184°5. rs. 181°9. |
| [2] Sn Pb. | 9.4263. | 241.° |
| [3] " | 9.288. | 182°2. |
| [4] " | 9.394. | |
| [5] " | 9.460, 15°5. | |
| [6] " | 9.458. | |
| [7] " | 9.4330. | 235.° |
| [8] " | 9.451. | |
| [9] $Sn_3 Pb_4$. | 9.6399, 15.° | 236.° |
| [10] $Sn_2 Pb_3$. | 9.7971. | 246.° |
| [11] $Sn Pb_2$. | 10.0782. | |
| [12] " | 9.966. | |
| [13] " | 10.080, 14°8. | |
| [14] " | 10.105. | |
| [15] " | 10.0520. | 270.° |
| [16] " | 10.110. | |
| [17] $Sn Pb_3$. | 10.3868. | 289.° |
| [18] " | 10.421. | |
| [19] " | 10.3311. | 283.° |
| [20] " | 10.419. | |
| [21] $Sn Pb_4$. | 10.5551. | |
| [22] " | 10.590, 14°3. | |
| [23] " | 10.587. | |
| [24] " | 10.5957. | 292.° |
| [25] $Sn Pb_5$. | 10.751. | |
| [26] $Sn Pb_6$. | 10,815, 15°6. | |
| TIN AND IRON. | | |
| [27] $Fe Sn_2$. | 7.446. | |
| [28] $Fe Sn_5$. Cryst. furnace product. | 7.534. | |
| [29] $Fe_3 Sn$. | 8.733. | |
| TIN AND COPPER. | | |
| [30] $Sn_5 Cu$. | 7.442. | |
| [31] " | 7.517. | |
| [32] " | 7.28. | |

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| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Sn_4$ Cu. | 7.472. | |
| [2] " | 7.558. | |
| [3] " | 7.31. | |
| [4] $Sn_3$ Cu. | 7.447. | |
| [5] " | 7.606. | |
| [6] " | 7.44. | |
| [7] $Sn_5$ $Cu_2$. | 7.652. | |
| [8] $Sn_7$ $Cu_3$. Cryst. furnace product. | 6.994. | |
| [9] $Sn_2$ Cu. | 7.387. | |
| [10] " Crystallized. | 7.53. | |
| [11] " | 7.738. | |
| [12] " | 7.83. | |
| [13] Sn Cu. | 8.056. | |
| [14] " | 8.072. | |
| [15] " | 7.992. | |
| [16] " | 7.90. | |
| [17] $Sn_2$ $Cu_3$. | 8.06. | |
| [18] Sn $Cu_2$. | 8.416. | |
| [19] " | 8.512. | |
| [20] " | 8.533. | |
| [21] " | 8.15. | |
| [22] Sn $Cu_3$. | 8.539. | |
| [23] " | 8.954. | |
| [24] " | 8.91. | |
| [25] Sn $Cu_4$. | 8.400. | |
| [26] " | 8.948. | |
| [27] " | 8.77. | |
| [28] Sn $Cu_5$. | 8.575. | |
| [29] " | 8.965. | |
| [30] " | 8.62. | |
| [31] Sn $Cu_6$. | 8.750. | |
| [32] " | 8.65. | |
| [33] Sn $Cu_7$. | 8.728. | |
| [34] " | 8.72. | |

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[33] Mallet. Ding. J. 85. 378.
[34] Riche. 21. 270.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Sn\ Cu_8$. | 8.459. | |
| [2] " | 8.84. | |
| [3] $Sn\ Cu_9$. | 8.462. | |
| [4] $Sn\ Cu_{10}$. | 8.561. | |
| [5] " | 8.832. | |
| [6] " | 8.87. | |
| [7] $Sn\ Cu_{15}$. | 8.825. | |
| [8] " | 8.84. | |
| [9] $Sn\ Cu_{20}$. | 8.793. | |
| [10] $Sn\ Cu_{25}$. | 8.820. | |
| TIN AND ZINC. | | |
| [11] $Sn_2\ Zn$. | 7.235. | |
| [12] " | 7.274. | |
| [13] $Sn\ Zn$. | 7.115. | |
| [14] " | 7.262. | |
| [15] $Sn\ Zn_2$. | 7.096. | |
| [16] " | 7.188. | |
| [17] $Sn\ Zn_3$. | 7.180. | |
| [18] $Sn\ Zn_4$. | 7.155. | |
| [19] $Sn\ Zn_5$. | 7.140. | |
| [20] $Sn\ Zn_{10}$. | 7.135. | |
| TIN AND CADMIUM. | | |
| [21] $Sn_6\ Cd$. | 7.434, 12°7. | |
| [22] $Sn_4\ Cd$. | 7.489, 15.° | |
| [23] $Sn_2\ Cd$. | 7.690, 12°9. | |
| [24] " | | 173°8. |
| [25] $Sn\ Cd$. | 7.904, 13°2. | |
| [26] $Sn\ Cd_2$. | 8.139, 11°1. | |
| [27] $Sn\ Cd_4$. | 8.336, 14°5. | |
| [28] $Sn\ Cd_6$. | 8.432, 15.° | |
| TIN AND ANTIMONY. | | |
| [29] $Sn_{100}\ Sb$. | 7.284, 20°2. | |
| [30] $Sn_{50}\ Sb$. | 7.279, 20.° | |

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| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Sn_{20}$ Sb. | 7.276, 19°4. | |
| [2] $Sn_{10}$ Sb. | 7.208, 18°5. | |
| [3] $Sn_5$+ Sb. | 7.140, 19.° | |
| [4] $Sn_3$ Sb. | 7.100, 10°6. | |
| [5] $Sn_2$ Sb. | 7.023, 15°8. | |
| [6] Sn Sb. | 6.929, 15°8. | |
| [7] Sn $Sb_2$. | 6.844, 13°8. | |
| [8] Sn $Sb_4$. | 6.781, 13°5. | |
| [9] Sn $Sb_8$. | 6.747, 13°4. | |
| [10] Sn $Sb_{12}$. | 6.739, 16°2. | |
| TIN AND BISMUTH. | | |
| [11] $Sn_{22}$ Bi. | 7.438, 19°9. | |
| [12] $Sn_4$ Bi. | 7.943, 20.° | |
| [13] $Sn_7$ $Bi_2$. | 8.017. | |
| [14] $Sn_3$ Bi. | 8.097. | |
| [15] " | 8.112, 14°2. | |
| [16] $Sn_2$ Bi. | 8.339, 13°9. | |
| [17] " | 8.327. | |
| [18] $Sn_5$ $Bi_2$. | 8.199. | |
| [19] $Sn_3$ $Bi_2$. | 8.506. | |
| [20] Sn Bi. | 8.772, 12°6. | |
| [21] " | 8.754. | |
| [22] $Sn_3$ $Bi_4$. | | 136°4. |
| [23] $Sn_2$ $Bi_3$. | | 135°3. |
| [24] Sn $Bi_2$. | 9.178, 15°9. | |
| [25] " | 9.145. | |
| [26] Sn $Bi_4$. | 9.435, 15.° | |
| [27] " | 9.434. | |
| [28] Sn $Bi_8$. | 9.614, 12°7. | |
| [29] Sn $Bi_{12}$. | 9.675, 15°2. | |
| [30] Sn $Bi_{20}$. | 9.737, 19°8. | |
| [31] Sn $Bi_{60}$. | 9.774, 23.° | |
| [32] Sn $Bi_{88}$. | 9.803, 22°8. | |
| [33] Sn $Bi_{120}$. | 9.811, 19.° | |

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[33] Carty. P. T. 1860. 177.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Sn\ Bi_{180}$. | 9.814, 19°5. | |
| [2] $Sn\ Bi_{400}$. | 9.815, 18°1. | |
| TIN AND GOLD. | | |
| [3] $Sn_{50}\ Au$. | 7.441, 22°9. | |
| [4] $Sn_{15}\ Au$. | 7.801, 22°8. | |
| [5] $Sn_9\ Au$. | 8.118, 22°4. | |
| [6] $Sn_6\ Au$. | 8.470, 23°1. | |
| [7] $Sn_4\ Au$. | 8.931, 25°6. | |
| [8] $Sn_3\ Au$. | 9.405, 23°7. | |
| [9] $Sn_5\ Au_2$. | 9.715, 22°4. | |
| [10] $Sn_2\ Au$. | 10.168, 23°7. | |
| [11] $Sn_3\ Au_2$. | 10.794, 23°6. | |
| [12] $Sn\ Au$. | 11.833, 14°6. | |
| [13] $Sn\ Au_2$. | 14.244, 14°2. | |
| [14] $Sn\ Au_4$. | 16.367, 15°4. | |
| ALLOYS OF ALUMINUM. | | |
| [15] $Al_2\ Ag$. | 6.733. | |
| [16] $Al\ Ag$. | 8.744. | |
| [17] $Al\ Ag_2$. | 9.376. | |
| [18] $Al\ Cr$. | 4.9. | |
| [19] $Al_3\ Mn$. | 3.402. | |
| [20] $Al_6\ Ni$. | 3.647. | |
| [21] $Al_{44}\ Cu$. | 2.764. | |
| [22] $Al_6\ Cu$. | 3.206. | |
| [23] $Al_5\ Cu$. | 3.316. | |
| [24] $Al_{11}\ Cu_3$. | 3.579. | |
| [25] $Al_7\ Cu_2$. | 3.724. | |
| [26] $Al_3\ Cu$. | 3.972. | |
| [27] $Al_9\ Cu_4$. | 4.148. | |
| [28] $Al_2\ Cu$. | 4.355. | |
| [29] $Al\ Cu$. | 5.731. | |
| [30] $Al\ Cu_2$. | 6.946. | |
| [31] $Al\ Cu_3$. | 7.204. | |
| [32] $Al\ Cu_4$. | 7.534. | |

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[29] Hirzel. 11. 138.
[30] Hirzel. 11. 138.
[31] Hirzel. 11. 138.
[32] Hirzel. 11. 138.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Al\ Cu_5$. | 7.727. | |
| [2] $Al\ Cu_6$. | 7.751. | |
| [3] $Al_2\ Cu_{13}$. | 7.884. | |
| [4] $Al_4\ W$. | 5.58. | |
| [5] Al Zn. | 4.532. | |
| [6] $Al_6\ Sn$. | 3.583. | |
| [7] $Al_5\ Sn$. | 3.791. | |
| [8] $Al_4\ Sn$. | 4.025. | |
| [9] $Al_3\ Sn$. | 4.276. | |
| [10] $Al_2\ Sn$. | 4.744. | |
| [11] Al Sn. | 5.454. | |
| [12] $Al\ Sn_2$. | 6.264. | |
| [13] $Al\ Sn_3$. | 6.536. | |
| [14] $Al_3\ Nb$. | 4.45—4.52. | |
| [15] $Al_3\ Ta$. | 7.02. | |
| ALLOYS OF MERCURY. AMALGAMS. | | |
| [16] Hg Pb. | 11.93. | |
| [17] " | 12.284, 15°7. | |
| [18] $Hg\ Pb_2$. | 11.979, 15°9. | |
| [19] $Hg_2\ Pb$. | 12.815, 15°5. | |
| [20] $Hg_5\ Cd_2$. | 12.615. | |
| [21] Hg Zn. | 11.304. | |
| [22] Hg Bi. | 11.208. | |
| [23] $Hg\ Bi_2$. | 10.693. | |
| [24] " | 10.45. | |
| [25] $Hg\ Bi_3$. | 10.474. | |
| [26] $Hg\ Bi_4$. | 10.350. | |
| [27] $Hg\ Bi_5$. | 10.240. | |
| [28] $Hg_2\ Au$. | 15.412. | |
| [29] $Hg_2\ Sn$. | 11.3816. | |
| [30] " | 11.456, 11°3. | |
| [31] Hg Sn. | 10.3447. | |
| [32] " | 10.369, 14°2. | |
| [33] " | 10.255. | |

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| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [1] $Hg\ Sn_2$. | 9.3185. | |
| [2] " | 9.362, 9°9. | |
| [3] " | 9.314. | |
| [4] $Hg\ Sn_3$. | 8.8218. | |
| [5] " | 8.805. | |
| [6] $Hg\ Sn_4$. | 8.510. | |
| [7] $Hg\ Sn_5$. | 8.312. | |
| [8] $Hg\ Sn_6$. | 8.151. | |

## 2d. ALLOYS OF MORE THAN TWO METALS.

| Alloy. | Specific Gravity. | Melting Point. |
|---|---|---|
| [9] $Cd\ Pb_3\ Bi_4$. | 10.563. | 89°5. |
| [10] $Cd_2\ Pb_7\ Bi_8$. | 10.732. | 95.° |
| [11] $Zn\ Pb_2\ Sn_9$. | | 168.° |
| [12] $Pb\ Sn\ Bi_3$. | | 96.° |
| [13] $Pb\ Sn_2\ Bi_2$. | | 145.° |
| [14] $Cu_3\ Ni\ Sb_3$. Furnace product. | 8.004. | |
| [15] $Cd\ Sn\ Pb\ Bi_2$ | 9.765. | 68°5. |
| [16] $Cd\ Sn_2\ Pb_2\ Bi_4$. | 9.784. | 68°5. |
| [17] $Cd_3\ Sn_4\ Pb_4\ Bi_8$. | 9.725. | 67°5. |
| [18] $Cd_4\ Sn_5\ Pb_5\ Bi_{10}$. | 9.685. | 65°5. |

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Those who wish further details concerning Alloys and Amalgams, can find copious information in "Watts' Dictionary of Chemistry," under the headings of the various metals.

For many Amalgams, see Joule, Journ. Chem. Soc., 1863, vol. 16.

For Alloys of Pt. and Au., see Prinsep, Phil. Trans., 1828.

## XXXIX. Hydrocarbons.

### 1st. SERIES OF ALCOHOL RADICLES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Propyl, or trityl. | $(C_3 H_7)_2$. | .6745, 18.° | 68.° | |
| [2] | " Di-iso-propyl. | " | .6769, 10.° | 58.° | |
| [3] | " " | " | .6701, 17°5. | | |
| [4] | " " | " | .6569, 29.° | | |
| [5] | " Hexane. | " | .6630, 17.° | 69°—71°. | |
| | [Compare propyl with hexyl hydride.] | | | | |
| [6] | Ethyl butyl. | $C_2 H_5 . C_4 H_9$. | .7011, 0.° | 62.° | |
| [7] | Ethyl amyl. | $C_2 H_5 . C_5 H_{11}$. | .7069, 0.° | 88.° | |
| [8] | " " | " | .6819, 17°5. | 90°—91.° | |
| [9] | " " | " | .6795, 20.° | | |
| [10] | " " | " | .6833, 18°4. | 90.° | |
| [11] | Methyl caproyl. | $C H_3 . C_6 H_{13}$. | | 82.° | |
| [12] | " " | " | 6789, 19.° | 89°—91.° | |
| [13] | Butyl, or tetryl. | $(C_4 H_9)_2$. | 6940, 18.° | 108.° | |
| [14] | " | " | .7057, 0.° | 106.° | |
| [15] | " | " | .728 | | |
| [16] | " | " | .7135, 0.° | 109. | |
| [17] | " | " | .7001, 16°4. | | |
| [18] | " | " | .6945, 18.° | 119.° | |
| [19] | " | " | .7083, 12°5. | 124.° | |
| [20] | " Octane. | " | .7032, 17.° | 123°–125.° | |
| [21] | " Isobutyl. | " | .723, 0.° | 127.° | |
| [22] | " " | " | .721, 10.° | | |
| [23] | Amyl isopropyl. | $C_3 H_7 . C_5 H_{11}$. | .698, 16°5. | 109°–110.° | |
| [24] | " " | " | .6712, 49.° | | |
| [25] | Butyl amyl. | $C_4 H_9 C_5 H_{11}$. | .7247, 0°. | 132.° | |
| [26] | Amyl. | $(C_5 H_{11})_2$. | .7704, 11.° | 155.° | |

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[7] Wurtz. 8. 576. [136. 257.
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[22] Riche. 13. 248.
[23] Schorlemmer. 20. 567.
[24] Schorlemmer. 20. 567.
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[26] Frankland. 3. 479.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Amyl. | $(C_5 H_{11})_2$. | .7413, 0.° | 158.° | |
| [2] | " | " | .7282. 20.° | | |
| [3] | " | " | .7365, 18.° | 159.° | |
| [4] | Butyl hexyl. | $C_4 H_9 . C_6 H_{13}$. | | 155.° | |
| [5] | Hexyl, or caproyl. | $(C_6 H_{13})_2$. | | 202.° | |
| [6] | " | " | .7574, 0.° | 202.° | |
| [7] | " | " | .7568, 18.° | 202. | |
| [8] | " Dodecane. | " | .7738, 17.° | 201.° | |

## 2d. HYDRIDES OF ALCOHOL RADICLES.

Compare with Isomers among the Radicles themselves.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [9] | Propyl hydride. | $C_3 H_7 . H$. | .613,—25.° | −25°to—30°. | |
| [10] | Butyl " | $C_4 H_9 . H$. | .600, 0.° | a. 0.° | |
| [11] | " " | " | .600, 0.° | 0°–4. | |
| [12] | " " | " | .624,—1.° | a. 0.° | |
| [13] | Amyl " | $C_5 H_{11} . H$. | .6413, 11°2. | 30.° | |
| [14] | " " | " | .6385, 14°2. | 734. m. m. | |
| [15] | " " | " | .636, 17.° | 39°—40.° | |
| [16] | " " | " | .6263, 17.° | 34.° | |
| [17] | " " | " | .628.18.° | 30.° | |
| [18] | Hexyl " Alpha. | $C_6 H_{13} . H$. | .668, 0.° | 58.° | |
| [19] | " " " | " | .678, 15°5. | 68°—70.° | |
| [20] | " " " | " | .669, 16.° | 68.° | |
| [21] | " " " | " | | 60°—64.° | |
| [22] | " " | " | | 68°5. | |
| [23] | " " Beta. | " | .6645, 16°5. | 68°5—70.° | |
| [24] | " " (?) | " | .6617, 17°5. | 69°5. | |
| [25] | " " (?) | " | .676, 0°. | 61°3. | |
| [26] | " " (?) | " | .689, 0.° | 68°5. | |
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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Heptyl hydride. | $C_7 H_{15}$. H. | .7259, 0.° | | |
| [2] | " " | " | .7148, 15.° | 90°—92.° | |
| [3] | " " | " | .6999, 32.° | | |
| [4] | " " | " | .6867, 48.° | | |
| [5] | " " | " | .709, 17°5. | 98°—99.° | |
| [6] | " " | " | .7122, 16.° | 98.° | |
| [7] | " " | " | .699, 16.° | 92°—94.° | |
| [8] | " " | " | .6851, 17°5. | 98°—99.° | |
| [9] | " " | " | .6840, 20°5. | 100°5. | |
| [10] | " " | " | .7085, 0.° | 97°8. | |
| [11] | Octyl " | $C_8 H_{17}$. H. | .719, 17°5. | 119°—120.° | |
| [12] | " " | | .726, 15.° | 116°—118.° | |
| [13] | " " | " | .728, 0.° | 115°—118.° | |
| [14] | Nonyl hydride. | $C_9 H_{19}$. H. | .741. | 136°—138.° | |
| [15] | Decatyl " | $C_{10} H_{21}$. H. | .757, 16.° | 158°—162.° | |
| [16] | " " | " | .753, 0.° | 155°—157.° | |
| [17] | Endecatyl hydride. | $C_{11} H_{23}$. H. | .766. | 180°—182.° | |
| [18] | Duodecatyl " | $C_{12} H_{25}$. H. | .778, 20.° | 196°—200.° | |
| [19] | ———— " | $C_{13} H_{27}$. H. | .796, 17.° | 218°—220.° | |
| [20] | ———— " | $C_{14} H_{29}$. H. | .809, 20.° | 236°—240.° | |
| [21] | ———— " | $C_{15} H_{31}$. H. | .825, 19.° | 258°—262.° | |

## 3d. METHYLENE SERIES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [22] | Butylene. | $C_4 H_8$. | .739, 0.° | 12°—14.° | |
| [23] | Amylene. | $C_5 H_{10}$. | | 39.° | |
| [24] | " | " | | 42.° | |
| [25] | " | " | | a. 35. | |
| [26] | " | " | .6517, 16°5. | | |
| [27] | " | " | .6633, 0.° | 35.° | |

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[8] Dale. 17.381. From azelaic acid.

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Amylene. | $C_5 H_{10}$. | .66277, 0.° | 30°, to 35°5. | |
| [2] | " | " | .65490, 10.° | | |
| [3] | " | " | .64450, 17.° m. of 4. | | |
| [4] | " | " | .62384, 33.° m. of 2. | | |
| [5] | " | " | .625812, 33°5. m. of 2. | | |
| [6] | " | " | .62634, 35°5. m. of 2. | | |
| [7] | " | " | .679, 0.° | 28°–30.° | |
| [8] | Diamylene. | $(C_5 H_{10})_2$. | .7777, 0.° | 165.° | |
| [9] | " (?) | " | .8416, 0.° | 150°–153.° | |
| [10] | " | " | .8248, 20.° | | |
| [11] | Triamylene. | $(C_5 H_{10})_3$. | .8139. | 245°–248.° | |
| [12] | Tetramylene. | $(C_5 H_{10})_4$. | .8710, 0.° | 390°–400.° | |
| [13] | Hexylene. | $C_6 H_{12}$. | | 71.° | |
| [14] | " | " | .709, 12.° | 68°–70.° | |
| [15] | " | " | | 68°–70.° | |
| [16] | " | " | | 68°–72.° | |
| [17] | " | " | .6937, 0.° | 68°–70.° | |
| [18] | " | " | .6986, 0.° | | |
| [19] | " | " | .702, 0.° | 68°–71.° | |
| [20] | " | " | | 64°–65.° | |
| [21] | Heptylene. | $C_7 H_{14}$. | .718, 18.° | 99.° | |
| [22] | " Two | " | .7060, 12°5. | 93°–95.° | |
| [23] | " preparations. | " | .7026, 19°5. | 95°–97.° | |
| [24] | " (?) | " | .6985, 14.° | 81°–83.° | |
| [25] | " | " | | 94°1. | |
| [26] | " | " | .7060, 16.° | 91.° | |
| [27] | Octylene. | $C_8 H_{16}$. | .708, 16.° | 106°–110.° | |
| [28] | " | " | .723, 17.° | 125°, 760.m.m. | |
| [29] | " | " | .737, 20.° | 122°–125.° | |
| [30] | " | " | | 115°–117.° | |
| [31] | " | " | | 118°–120.° | |
| [32] | " | " | .7396, 0.° | 125°2. | |
| [33] | Meta-octylene. | $(C_8 H_{16})_{2\cdot(?)}$ | .814, 15.° | a. 250.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Nonylene. | $C_9 H_{18}$. | .757, 20°5. | 144°–146.° | |
| [2] | | " | | a. 140.° | |
| [3] | " | " | .7618, 0.° | 153.° | |
| [4] | Decatylene. } From differ- | $C_{10} H_{20}$. | .7912, 0.° | 174°6. | |
| [5] | " ent sources. | " | .823, 0.° | 175°8. | |
| [6] | Endecatylene. | $C_{11} H_{22}$. | .782, 0.° | 195°8. | |
| [7] | " } From differ- | " | 8398, 0.° | 195°9. | |
| [8] | " ent sources. | " | .791, 0.° | 195°2. | |
| [9] | " | " | | 192°–193.° | |
| [10] | Duodecatylene. | $C_{12} H_{24}$. | .791, 0.° | 216°2. | |
| [11] | " } From differ- | " | .8361. | 212°6. | |
| [12] | " ent sources. | " | .8654–.8543, 0.° | 208°–219.° | |
| [13] | Tridecatylene. | $C_{13} H_{26}$. | .8445, 0.° | 230°–231.° | |
| [14] | Cetene. l. | $C_{16} H_{32}$. | | 275.° | |
| [15] | " | " | .7893, 15°2. | | |
| [16] | Cerotene. s. | $C_{27} H_{54}$. | .861, 15.° | | |
| [17] | " | " | | | 57°–58.° |
| [18] | Melene. s. | $C_{30} H_{60}$. | .89. | | |
| [19] | " | " | | | 62.° |
| [20] | Etherol. Polymer of $C_2 H_4$ | $(C_2 H_4)n$. | .9174. | | |
| [21] | " " " | " | .921. | 280.° | |

## 4th. BENZOL SERIES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [22] | Benzol. | $C_6 H_6$. | .85, 15°5. l. } | 86.° | 5°5. |
| [23] | " | " | .956,—18.° s. } | | |
| [24] | " | " | 85. | 86.° | 7.° |
| [25] | " | " | .85. | 80°—81.° | |
| [26] | " | " | .89911, 0.° m. of 2. } | | |
| [27] | " | " | .88372, 15°2. } | 80°4. | |
| [28] | " | " | .88354, 15°3. } | 760. m. m. | |
| [29] | " | " | | 82.° | s. 3.° |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Benzol. | $C_6 H_6$. | .8841, 15.° | | |
| [2] | " | " | .8667. | 80°8. | |
| [3] | " Parabenzol. | " | .8469 | 97°5. | |
| [4] | " From coal tar | " | .8957, 0.° | 80°1. | |
| [5] | " naphtha. | " | .8820, 15°5. | | |
| [6] | " | " | .895, 3.° | 80°5. | 3.° |
| [7] | " | " | .812, 80°5. | | |
| [8] | " | " | .8995, 0.° | | |
| [9] | " | " | .8890, 10.° | | |
| [10] | " | " | .8784, 20.° | | |
| [11] | " | " | .8568, 40.° | | |
| [12] | " | " | .8349, 60.° | | |
| [13] | " | " | .8126, 80.° | | |
| [14] | Toluol. | $C_7 H_8$. | | 114.° | |
| [15] | " | " | .87. | 108.° | |
| [16] | " | " | | 110°5. | |
| [17] | " | " | | 111.° | |
| [18] | " | " | .8650. | 103°7. | |
| [19] | " Paratoluol. | " | .8333. | 119°5. | |
| [20] | " | " | .8824, 0.° | 110°3. | |
| [21] | " | " | .8720, 15.° | | |
| [22] | " Methyl phenyl. | " | .881, 5.° | 111.° | |
| [23] | " | " | .8841, 0.° | | |
| [24] | " | " | .8657, 20.° | | |
| [25] | " | " | .8375, 50.° | | |
| [26] | " | " | .8086, 80.° | | |
| [27] | " | " | .7889, 100.° | | |
| [28] | Xylol. | $C_8 H_{10}$. | | 128°–130.° | |
| [29] | " | " | .8309, 15.° | | |
| [30] | " | " | | 126°2. | |
| [31] | " | " | | 140.° | |
| [32] | " From coal tar | " | .878, 0.° | 139°8. | |
| [33] | " naphtha. | " | .866, 15.° | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Xylol. | $C_8 H_{10}$. | | 135.° | |
| [2] | " Ethyl phenyl. | " | | 133.° | |
| [3] | " | " | .8668, 21.° | 139.° | |
| [4] | " Methyl benzyl. | " | .8621, 19°.5. | 139°–140.° | |
| [5] | " Isoxylol. | " | | 137°–138.° | |
| [6] | " | " | | 142°–142°.5. | |
| [7] | " | " | .8770, 0.° | | |
| [8] | " | " | .8600, 20.° | | |
| [9] | " | " | .8340, 50.° | | |
| [10] | " | " | .8073, 80.° | | |
| [11] | " | " | .7892, 100.° | | |
| [12] | " Ethyl benzol. | " | .8664, 22°.5. | 134.° | |
| [13] | Cumol. | $C_9 H_{12}$. | | 144.° | |
| [14] | " | " | | 148.° | |
| [15] | " | " | .87. | | |
| [16] | " | " | | 153.° | |
| [17] | " | " | | 148°.4. | |
| [18] | " From phorone. | " | .863, 13.° | 170°–175.° | |
| [19] | " From coal tar | " | .8643, 0.° | 169°.8. | |
| [20] | " naphtha. | " | .8530, 15.° | | |
| [21] | " From oil of | " | .8792, 0.° | 151°.1. | |
| [22] | " cummin. | " | .8675, 15.° | | |
| [23] | " Methyl xylol. | " | | 165°–166.° | |
| [24] | " From coal tar. | " | | 166.° | |
| [25] | Cymol. | $C_{10} H_{14}$. | .860, 14.° | 175.° | |
| [26] | " | " | .857, 16.° | 171°.5. | |
| [27] | " | " | | 175.° | |
| [28] | " | " | .8778, 0.° | 177°.5. | |
| [29] | " | " | .8678, 12°.6. | 743.7 m. m. | |
| [30] | " | " | | 171.° | |
| [31] | " | " | | 170°.7. | |
| [32] | " | " | .8660, 15.° | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Cymol. | $C_{10}H_{14}$. | .8664, 20.° | | |
| [2] | « } From | « | .8697, 0.° } | | |
| [3] | « } oil of | « | .8724. 0.° } | 179°5. | |
| [4] | « } cummin. | « | .8592, 14.° } | | |
| [5] | « } | « | .8705, 0.° } | | |
| [6] | « } From | « | .8544, 20.° } | 175°–176.° | |
| [7] | « } oil of | « | .8302, 50.° } | | |
| [8] | « } cummin. | « | .7893, 100.° } | | |
| [9] | « } | « | .8732, 0.° } | | |
| [10] | « } From | « | .8574, 20.° } | 174°–175.° | |
| [11] | « } camphor | « | .8333, 50.° } | | |
| [12] | « } and $PCl_5$. | « | .7919, 100.° } | | |
| [13] | « From camphor. | « | | 175°–178.° | |
| [14] | « Thymo-cymol. | « | | 173.° | |
| [15] | « Ethyl xylol. | « | .8783, 20.° | 183°–184.° | |
| [16] | « Diethyl benzol. | « | .8707, 15°5. | 178°–179.° | |
| [17] | « Isobutyl benzol. | « | .8577, 16.° | 159°–161.° | |
| [18] | « Tetra methyl benzol | « | | 189°–191.° | 78–80.° |
| [19] | Amyl benzol. } | $C_{11}H_{16}$. | .859, 12.° | 195.° | |
| [20] | Diethyl toluol. } | « | .8751, 0.° | 178.° | |
| [21] | Laurol. } | « | .887, 10.° | 188.° | |
| [22] | Amyl toluol. | $C_{12}H_{18}$. | .8643, 9.° | 213.° | |
| [23] | Amyl xylol, | $C_{13}H_{20}$. | .8951, 9.° | 232°–233.° | |
| | [For mesitylene, see miscellaneous hydrocarbons.] | | | | |

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[8] Louguinine. 30.

For many other determinations taken between 0° and 100°, see original paper.

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[10] Louguinine. 30.

[11] Louguinine. 30.

[12] Louguinine. 30.

For many other determinations taken between 0° and 100°, see original paper.

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[20] Lippmann & Louguinine. 20. 667.

[21] Fittig, Köbrich & Jilke. 20. 701.

[22] Bigot & Fittig. 20. 667.

[23] Bigot & Fittig. 20. 697.

## 5th. $C_{10}$ $H_{16}$ AND ITS ISOMERS.

Chiefly Hydrocarbons from Essential Oils.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [For valerylene and isoprene, see miscellaneous hydrocarbons.] | | | | |
| [1] From oil of anise. | $C_{10}$ $H_{16}$. | .8580, 20.° | 160.° | |
| [2] Geraniene. | " | .842–.843, 20.° | 162°–164.° | |
| [3] From oil of neroli. | " | .8466, 20.° | 173.° | |
| [4] " " petit grain. | " | .8470, 20.° | 174.° | |
| [5] " " orange peel. | " | .8460, | 174.° | |
| [6] " " " " | " | .8468, 20.° | | |
| [7] " fruit of Citrus lumia. | " | .853, 18.° | 180.° | |
| [8] " " " bigaradia. | " | .8520, 10.° | 178.° | |
| [9] " " " " | " | .8517, 12.° | | |
| [10] " " " medica.) | " | .8514, 15.° | 55. (?) | |
| [11] " oil of cedrat. | " | .8466, 20.° | 173.° | |
| [12] " " bergamot. | " | .8464, | 175°–176.° | |
| [13] " " " | " | .8466, 20.° | | |
| [14] " " lemon. | " | .84,–.86. | | |
| [15] " " " | " | | 173.° | |
| [16] " " " | " | | 176?1. | |
| [17] " " " | " | .8380, 0.° | | |
| [18] " " " | " | .8661, 0.° | | |
| [19] " " " | " | .8468, 20. | 173.° | |
| [20] Citrene. | " | .8569. | 165.° | |
| [21] Cicutene. Fr. Cicuta virosa. | " | .87038, 18.° | 166.° | |
| [22] From oil of parsley. | " | .8732, 20.° | 160.° | |
| [23] " " cummin. | " | .8772, 0.° | 155?8. | |
| [24] " " " | " | .8657, 15.° | | |
| [25] " " galbanum. | " | .8842, 9.° | 160.° | |
| [26] " " caraway. | " | .8466, 20.° | 176.° | |
| [27] Carvene. | " | .861, 15.° | 175°–178.° | |
| [28] " | " | .8530, | 166.° | |
| [29] " | " | .8545, 20.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] From oil of dill. | $C_{10}H_{16}$. | .8467, 20.° | 173.° | |
| [2] " " elder. | " | .8468, 20.° | 172.° | |
| [3] Safrene. | " | .8345, 0.° | 155°–157.° | |
| [4] From oil of wormwood. | " | .8565, 20.° | 160.° | |
| [5] " " mint. | " | .8600, 20.° | 160.° | |
| [6] " " peppermint. | " | .8602, 20.° | 175.° | |
| [7] " " thyme. | " | .8635, 20.° | 160.° | |
| [8] Thymene. | " | .868, 20.° | 160°–165.° | |
| [9] Gaultherilene. | " | .8510, 20.° | 168.° | |
| [10] From oil of rosemary. | " | .8805, 20.° | 163.° | |
| [11] Cinaëbene. | " | .878. | 172.° | |
| [12] Cynene. | (?) " | .825, 16.° | 173°–175.° | |
| [13] From oil of nutmegs. | " | .8518 | 166°–167.° | |
| [14] " " " | " | .8527 20.° | | |
| [15] " " bay. | " | .908, 15.° | 164.° | |
| [16] " " " | " | .8508, 20. | 171.° | |
| [17] " " birch tar. | " | .870, 20.° | 156.° | |
| [18] " " cascarilla. | " | .8467, 20.° | 172.° | |
| [19] " " myrtle. | " | .8690, 20.° | 163.° | |
| [20] " laurel turpentine. | " | .8618, 20.° | 160.° | |
| [21] " Eucalyptus amygdalina. | " | .8642, 20.° | 171.° | |
| [22] " Ptychotis ajowan. | " | .854, 12.° | 172.° | |
| [23] " elemi. | " | .849, 11.° | 174.° | |
| [24] " " | " | .852, 24.° | 166.° | |
| [25] Olibene. | " | .863, 12.° | 156°–158.° | |
| [26] Cajeputene. | " | .850, 15.° | 160°–165.° | |
| [27] Isocajeputene. | " | .857, 16.° | 176°–178.° | |
| [28] By distillation of copal oil. | " | .951, 10.° | 160°–165.° | |
| [29] Caoutchin. | " | .842, 20.° | 171.° | |
| [30] Tolene. | " | .858, 10.° | 154°–160.° | |
| [31] " | " | | 170.° | |
| [32] Xanthoxylene. | " | | 162.° | |
| [33] From Pinus maritima. | " | .864, 16.° | 80°–100.° | |
| [34] " " pumilis. | " | .875, 17.° | 161.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | From Pinus picea. | $C_{10}H_{16}$. | .859, 6.° | 168°–173.° | |
| [2] | " " abies. | " | .856, 20.° | 167.° | |
| [3] | " Abies Reginæ Amaliæ. | " | .868. | 156°–192.° | |
| [4] | Oil of turpentine. | " | .8902, 0.° | | |
| [5] | " " | " | .880. | 165.° | |
| [6] | " " | " | .8644. | | |
| [7] | " " Four | " | .8555. | | |
| [8] | " " samples. | " | .8614. | 20.° | |
| [9] | " " | " | .8600. | | |
| [10] | Terebene. | " | .8718. | 171.° | |
| [11] | " | " | .864. | 156.° | |
| [12] | " | " | | 160.° | |
| [13] | " | " | .8583, 20.° | 160.° | |
| [14] | Isoterebenthene. | " | .8432, 22.° | 176°–178.° | |
| [15] | Austrapyrolene. | " | .847. | 177.° | |
| [16] | Terebilene. | " | .843. | 134.° | |
| [17] | Camphilene. | " | .87. | 156.° | |
| [18] | Sesquiterebene. | $C_{15}H_{24}$. | | 250.° | |
| [19] | Metatemplene. | " | 1.037, 4.° | 280.° | |
| [20] | Para-copaiva oil. | " | .91. | 252.° p. d. | |
| [21] | From Maracaibo balsam. | " | .921, 10.° | 250°–260.° | |
| [22] | " Gurgun " | " | .9044, 15.° | 255.° | |
| [23] | " Drybalanops camphora. | " | .9—.921, 20.° | 255°–270.° | |
| [24] | " oil of cloves. | " | .918, 18.° | 142°–143.° | |
| [25] | " " " | " | .9016, 14.° | 251.° | |
| [26] | " " " | " | .9041, 20.° | 249.° | |
| [27] | " " cubebs. | " | .915; 930; 938. | 250.° | |
| [28] | " " " | " | .929. | 250°–260.° | |
| [29] | " " " | " | .9062, 20.° | 260.° | |
| [30] | " Myrtus pimenta. | " | .98, 8.° | 255.° | |
| [31] | " Laurus nobilis. | " | .925, 15.° | 250.° | |
| [32] | " oil of rosewood. | " | .9042, 20.° | 249.° | |
| [33] | " " calamus. | " | .9180, | 260.° | |
| [34] | " " " | " | .9275, 20.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] From oil of cascarilla. | $C_{15}$ $H_{24}$. | .9212, 20.° | 254.° | |
| [2] " " patchouli. | " | .9211, } 20.° | 254.° | |
| [3] " " " | " | .9278, } 20.° | 257.° | |
| [4] " " " | " | .9255, } 20.° | 260.° | |
| [5] Diterebene. | $C_{20}$ $H_{32}$. | .94. | 310°–315.° | |
| [6] Metaterebenthene. | " | .913, 20.° | a. 360.° | |
| [7] Colophene. | " | .9391, 20.° | 315.° | |
| [8] " | " | .94. | 310.° | |
| [9] Heveéne. | " | .921, 21.° | 315.° | |

## 6th. MISCELLANEOUS HYDROCARBONS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [10] Diallyl. | $(C_3 H_5)_2$. | .684, 14.° | 59.° | |
| [11] " | " | .68724, 17.° m. of 4. } | 58° | |
| [12] " | " | .64682, 59°5. m. of 2. } | to | |
| [13] " | " | .64564, 58.° m. of 2. } | 59°5. | |
| [14] Hexoylene. | $C_6$ $H_{10}$. | .710, 13.° | 76°–80° | |
| [15] Carbo dimethyl diethyl. | $C_7$ $H_{16}$. | .7111, 0.° } | 86°–87.° | |
| [16] " " " | " | .6958, 20°5. } | | |
| [17] Cinnamene, or Styrol. | $C_8$ $H_8$. | .928, 15.° | 144.° | |
| [18] " " " | " | .924. | 145°75. | |
| [19] " " " | " | .876–.896, 16.° | 140.° | |
| [20] Metacinnamene. | " | 1.054, 13.° s. | | |
| [21] Valerylene. | $C_5$ $H_8$. | | 44°–46.° | |
| [22] " | " | .69999, 0.° } | 41°–42.° | |
| [23] " | " | .687386, 17.° m. of 2. } | | |
| [24] " | " | .65719, 41.° m. of 2. } | | |
| [25] " | " | .65082, 42.° } | | |
| [26] Trivalerylene. | $(C_5 H_8)_3$. | .862, 15.° | 265°–275.° | |
| [27] Isoprene. | $C_5$ $H_8$. | .6823, 20.° | 37°–38.° | |
| [28] Valylene. | $C_5$ $H_6$. | | a. 50.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ethyl vinyl. | $C_4 H_8$. | | —5.° | |
| [2] Caoutchene. | " | .65,—2.° | 14°5. | —10.° |
| [3] Menthene. | $C_{10} H_{18}$. | .851, 21.° | 163.° | |
| [4] " | " | | 163.° | |
| [5] Rutylene. | " | | a. 150.° | |
| [6] Crotonylene. | $C_4 H_6$. | | 18.° | |
| [7] Conylene. | $C_8 H_{14}$. | .76076, 15.° | 126.° | |
| [8] From Camphoric acid. | " | .814, 0.° | 119.° | |
| [9] Benylene. | $C_{15} H_{28}$. | .9114, 0.° | 223°–228.° | |
| [10] Eucalyptene. | $C_{12} H_{18}$. | 836, 12.° | 165.° | |
| [11] Camphin. | $C_{18} H_{32}$. | 827, 25.° | 167°–170.° | |
| [12] Cedrene. | $C_{16} H_{24}$. | .984, 14°5. | 248.° | |
| [13] Mesitylene. | $C_9 H_{12}$. | | 155°–160.° | |
| [14] " | " | | 162°–164.° | |
| [15] " | " | | 163.° | |
| [16] Dibenzyl. | $C_{14} H_{14}$. | | 284.° | s. 51°5–52°5. |
| [17] " | " | 1.002, 14.° | 282.° | |
| [18] " | " | .9945, 10°5. | 272.° | |
| [19] " | " | | | 52°5–53°5. |
| [20] Naphthaline. l. | $C_{10} H_8$. | .9774, 79°2. m. of 3. | 216°4–216°8. | 79°2. |
| [21] " l. | " | .9628, 99°2. | | 79°91. |
| [22] " | " | | 212.° | 79.° |
| [23] " | " | | 221.° | |
| [24] " s. | " | 1.15173, 19.° | | |
| [25] " s. | " | 1.153, 18.° | | |
| [26] " s. | " | 1.048. | | |
| [27] " [dride. | " | | | 81.° |
| [28] Naphthaline tetrahy- | $C_{10} H_{12}$. | .981, 12.° | 205.° | |
| [29] Methyl naphthaline. l. | $C_{11} H_{10}$. | 1.0287, 11°5. | 231°–232.° | |
| [30] Ethyl " l. | $C_{12} H_{12}$. | 1.0184, 10.° | 251°–252.° | |
| [31] Anthracene. | $C_{14} H_{10}$. | | 300°+. | 180.° |
| [32] " | " | 1.147. | | |
| [33] " | " | | | 213°3. |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Anthracene. | $C_{14}H_{10}$. | | 360°+. | 213.° |
| [2] Anthracene dihydride. | $C_{14}H_{12}$. | | 305.° | 106.° |
| [3] " hexhydride. | $C_{14}H_{16}$. | | 290.° | 63.° |
| [4] Stilbene. | $C_{14}H_{12}$. | | | 125.° |
| [5] " | " | | | 115°–118.° |
| [6] Pyrene. | $C_{16}H_{10}$. | | | 170°–180.° |
| [7] " | " | | | 142.° |
| [8] Chrysene. | $(C_6H_4)_n$. | | | 230°–235.° |
| [9] Paranicene. | $C_{10}H_{12}$. | 1.24. | 365.° | |
| [10] Retene. | $C_{18}H_{18}$. | | | 98°–99.° |
| [11] Könlite. | $(C_6H_6)_n$. | .88. | | 107°5. |
| [12] " | " | | | 114.° |
| [13] Scheererite. | $(CH_4)_n$. | 1.0–1.2. | near 100.° | 44.° |
| [14] Hartite. | $(C_3H_5)_n$. | 1.046. | | 74.° |

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# XL. Compounds Containing C H, and O.

## 1st. ALCOHOLS OF THE ETHYLIC SERIES.

Note.—For common alcohol there is such a great number of determinations, both of Specific Gravity and Boiling Point, that the compiler has not thought it necessary or advisable to attempt to give them all. Therefore only the more important determinations for this substance are given.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Methyl alcohol. | $C H_4 O$. | .798, 20.° | 66°5. | |
| [2] | " " | " | | 60°,744 m.m. | |
| [3] | " " | " | .807, 9.° | | |
| [4] | " " | " | .813. | | |
| [5] | " " | " | .82074, 0.° | 66°3. | |
| [6] | " " | " | .7938, 25.° | | |
| [7] | " " | " | .81796, 0.° | 65°5. | |
| [8] | " " | " | .80307, 16°9. | | |
| [9] | " " | " | | 65°8. | |
| [10] | " " | " | | 66°5. | |
| [11] | " " | " | .8065, 15.° | | |
| [12] | " " | " | .8052, 9°5. | 60°5. | |
| [13] | " " | " | .8142, 0.° | | |
| [14] | " " | " | .7997, 16°4. | | |
| [15] | " " | " | .8574, 21.° | 66°–66°5. | |
| [16] | " " | " | .81571, 10.° | 58°6. | |
| [17] | Ethyl " | $C_2 H_6 O$. | .7924, 17°9. | 78°4. | |
| [18] | " " | " | .7915, 18.° | 76.° | |
| [19] | " " | " | .8095, 0.° | 78°1–79.° | |
| [20] | " " | " | .7996, 15.° | 78°8. | |
| [21] | " " | " | .81087, 0.° | | |
| [22] | " " | " | .8095, 0.° | 78°4. | |
| [23] | " " | " | .79821, 14.° | | |
| [24] | " " | " | .7990, 14°8. | | |

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[24] Kopp. 13.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Ethyl alcohol. | $C_2H_6O$. | .8151, 0.° | 78°3. | |
| [2] | " " | " | | 77°9. | |
| [3] | " " | " | | 78°4. | |
| [4] | " " | " | .7938, 15°5. | 80°6. | |
| [5] | " " | " | .7897. } 21.° | | |
| [6] | " " | " | .7905. } | | |
| [7] | " " | " | .79381, 15°6. | | |
| [8] | " " | " | .809, 5.° | 78°25. | |
| [9] | " " | " | .8194, 19.° | 81.° | |
| [10] | " " | " | .6796, 130°9. | | |
| [11] | " " | " | .7947, 15.° | | |
| [12] | " " | " | .7946. } 15.° | | |
| [13] | " " | " | .7947. } | | |
| [14] | " " | " | .80625, 0.° | | |
| [15] | " " | " | .80207, 5.° | | |
| [16] | " " | " | .79788, 10.° | 78°3. | |
| [17] | " " | " | .79367, 15.° | to | |
| [18] | " " | " | .78945, 20.° | 78°307. | |
| [19] | " " | " | .78522, 25.° | | |
| [20] | " " | " | .78096, 30.° | | |
| [21] | " " | " | .8086, 19.° | 77°–77°5. | |
| [22] | Propyl " iso. | $C_3H_8O$. | .791, 15.° | 83°–84.° | |
| [23] | " " " | " | .7915, 16°5. | 83°–85.° | |
| [24] | " " | " | .820, 0.° | | |
| [25] | " " | " | .812, 10°3. | | |
| [26] | " " | " | .780, 51°1. | 98°5. | |
| [27] | " " | " | .749, 84.° | | |
| [28] | " " | " | .813, 13.° | 97°–101.° | |
| [29] | " " | " | .812, 16.° | 97°–98.° | |
| [30] | " " | " | .823, 0.° | 96.° | |
| [31] | " " | " | .8205, 0.° | 96°–97.° | |
| [32] | Butyl " | $C_4H_{10}O$. | .8032, 18°5. | 109.° | |
| [33] | " " | " | .817, 0.° } | | |
| [34] | " " | " | .809, 11.° } | 107°5. | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Butyl alcohol. | $C_4H_{10}O$. | .774. 55.° | 107°5. | |
| [2] | " " | " | .732, 100.° | | |
| [3] | " " | " | .8055, 16°8. | 108°5. | |
| [4] | " " | " | .826, 0.° | 115°–116.° | |
| [5] | " " | " | .8239, 0.° | | |
| [6] | " " | " | .8105, 20.° | | |
| [7] | " " | " | .7994, 40.° | 116.° | |
| [8] | " " | " | .7738, 98°7. | | |
| [9] | " " | " | .7735, 98°9. | | |
| [10] | " " iso. | " | .85, 0.° | 96°–98.° | |
| [11] | " " " | " | .827, 0.° | 99.° | |
| [12] | " " " | " | .810, 22.° | | |
| [13] | " " " | " | .8003, 18.° | 108°39. | |
| [14] | Amyl " | $C_5H_{12}O$. | .8184, 15.° | 132. | |
| [15] | " " | " | .8137, 15.° | 133.° | |
| [16] | " " | " | .8271, 0.° | 131°8. | |
| [17] | " " | " | .8185, 15.° | 134.° | |
| [18] | " " | " | .8144, 15°9. | | |
| [19] | " " | " | .8145, 16°4. | 131°1. | |
| [20] | " " | " | .8127, 16°4. | 760. m. m. | |
| [21] | " " | " | .8253, 0.° mean. | | |
| [22] | " " | " | | 132.° | |
| [23] | " " | " | .818, 14.° | 132.° | |
| [24] | " " | " | | 127°–129.° | |
| [25] | " " | " | .8248, 0.° | 130°9–131°6. | |
| [26] | " " | " | .8113, 18°7. | | |
| [27] | " " | " | .819, 18.° | | |
| [28] | " " | " | .8142, 15.° | | |
| [29] | " " | " | .8296, 0.° | | |
| [30] | " " | " | .8168, 20.° | 137.° | |
| [31] | " " | " | .8065, 40.° | 740. m. m. | |
| [32] | " " | " | .7835, 99°15. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Amyl alcohol. iso. | $C_5H_{12}O$. | .8249, } 0.° | 120.° | |
| [2] | " " " | " | .8260, } | 759 m. m. | |
| | [For amylene hydrate, see miscellaneous compounds of the Ethylene Series.] | | | | |
| [3] | Hexyl alcohol. | $C_6H_{14}O$. | .833, 0.° } | 148°–154.° | |
| [4] | " " | " | .754, 100.° } | | |
| [5] | " " | " | .820, 17.° | 150°–152.° | |
| [6] | " " | " | .813, 0.° | 151°–156.° | |
| [7] | " " | " | .819. | 156°6. | |
| [8] | " " β. | " | .8327, 0.° } | | |
| [9] | " " " | " | .8209, 16.° } | 137.° | |
| [10] | " " " | " | .7482, 99.° } | 755.5 m. m. | |
| [11] | Heptyl " | $C_7H_{16}O$. | .792, 16°5. | 178.° | |
| [12] | " " | " | .819, 23.° | 177°–177°5. | |
| [13] | " " | " | | 178°5. | |
| [14] | " " | " | | 165.° | |
| [15] | " " | " | | 155°–160.° | |
| [16] | " " Products | " | .8291, 13°5. | 163°–165.° | |
| [17] | " " from four | " | .8286, 19°5. | 164°–167.° | |
| [18] | " " different | " | .795, 15.° | 163°–168.° | |
| [19] | " " sources. | " | .8479, 16.° | 164°5. | |
| [20] | Octyl " | $C_8H_{18}O$. | .823, 17.° | 179.° | |
| [21] | " " | " | | 178.° | |
| [22] | " " | " | | 179.° | |
| [23] | " " | " | .826, 16.° | 180°–184.° | |
| [24] | " " | " | | 181.° | |
| [25] | " " | " | .830. 16.° | 190°–192.° | |
| [26] | " " | " | | 196°–197.° | |
| [27] | Decatyl alcohol. | $C_{10}H_{22}O$. | .8569, 0.° | 203°3. | |
| [28] | Endecatyl " Secondary. | $C_{11}H_{24}O$. | .8268, 19.° | 228°–229.° | |
| [29] | Cetyl " | $C_{16}H_{34}O$. | | | s. 48.° |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Cetyl alcohol. | $C_{16} H_{34} O.$ | | | s. 49°–49°5. |
| [2] Ceryl « | $C_{27} H_{56} O.$ | | | 79.° |
| [3] Myricyl « | $C_{30} H_{62} O.$ | | | 85.° |

## 2d. OXIDES OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [4] Methyl oxide. | $C_2 H_6 O.$ | | —21.° | |
| [5] « « | « | | —23°65. | |
| [6] Methyl ethyl oxide. | $C_3 H_8 O.$ | | 11.° | |
| [7] « « « | « | | 11.° | |
| [8] Ethyl oxide. | $C_4 H_{10} O.$ | .7119, 24°8. | 35°7. | |
| [9] « « | « | .713, 20.° | 34.° | |
| [10] « « | « | .733, 12°5. | | |
| [11] « « | « | .73568, 0.° | 34°9. | |
| [12] « « | « | .72895, 6°9. m. of 2. | | |
| [13] « « | « | .73574, 0.° | 35°5. | |
| [14] « « | « | | 34°9. | |
| [15] « « | « | | 35°6. | |
| [16] « « | « | .728, 7.° | 35.° | |
| [17] « « | « | .73644, 0.° m. of 2. | | |
| [18] « « | « | .63987, 78°3. | | |
| [19] « « | « | .60896, 99°9. | | |
| [20] « « | « | .55958, 131°6. | | |
| [21] « « | « | .51735, 157.° | | |
| [22] « « | « | .7271, 10°2. | | |
| [23] « « | « | .7204, 15°8. | | |
| [24] Ethyl propyl oxide. | $C_5 H_{12} O.$ | .7447, 0.° | 54°–55.° | |
| [25] « butyl « | $C_6 H_{14} O.$ | .7507, 0.° | 78°–80.° | |
| [26] « « « | « | .761, 0.° | 91°5–92°5. | |
| [27] « « « | « | .7694, 0.° | | |
| [28] « « « | « | .7522, 20.° | 91°7. | |
| [29] « « « | « | .7367, 40.° | 742.7 m. m. | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Methyl amyl oxide. | $C_6 H_{14} O.$ | | 92.° | |
| [2] Ethyl " " | $C_7 H_{16} O.$ | | 112.° | |
| [3] " " " | " | | 111°–113.° | |
| [4] " " " | " | .8036, 14°7. | | |
| [5] " " " | " | .764°, 18.° | 112.° | |
| [Compare with amylene ethylate.] | | | | |
| [6] Ethyl hexyl oxide. | $C_8 H_{18} O.$ | .7752, 16°5. | | |
| [7] " " " | " | .7638, 30.° | 131°–133.° | |
| [8] " " " | " | .7344, 63.° | | |
| [9] " " " | " | .776, 13.° | 132°–134.° | |
| [10] Methyl heptyl " | " | 830, 16°5. | 160°5–161.° | |
| [11] Ethyl " " | $C_9 H_{20} O.$ | .791, 16.° | 177.° | |
| [12] Amyl " | $C_{10} H_{22} O.$ | .779. | 175°–183.° | |
| [13] " " | " | .7994, 0.° | 170°–175.° | |
| [14] Amyl heptyl " | $C_{12} H_{26} O.$ | .608, 20.° | 220°–221.° | |
| [15] Hexyl " β. | " | | 203°5–208°5 | |
| [16] Ethyl cetyl " | $C_{18} H_{38} O.$ | | | 20.° |
| [17] Amyl " " | $C_{21} H_{44} O.$ | | | 30.° |
| [18] Cetyl " | $C_{32} H_{66} O.$ | | | 55.° |

## 3d. ACIDS OF THE FORMIC SERIES. $C_n H_{2n} O_2$.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [19] Formic acid. | $C H_2 O_2.$ | 1.2353, 12.° | 98°5. | |
| [20] " " | " | 1.2227, 0.° | 105°3. | |
| [21] " " | " | 1.2067, 13°7. | 760 m. m. | |
| [22] " " | " | | 100.° | |
| [23] " " | " | | | 1.° |
| [24] " " | " | | 101°1. | |
| [25] " " | " | 1.2211, 20.° | 99°8–100°3. | |
| [26] " " | " | 1.2211, | | |
| [27] " " | " | 1.2165, 20.° | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Acetic acid. | $C_2 H_4 O_2$. | 1.0630, 16.° | | 22°5. |
| [2] | " " | " | | | 16.° |
| [3] | " " | " | | 114.° | |
| [4] | " " | " | | 120.° | |
| [5] | " " | " | 1.0622. | 119.° | |
| [6] | " " | " | 1.0635, 15.° | | |
| [7] | " " S. | " | 1.100, 8°5. | | |
| [8] | " " l. | " | 1.0650, 13.° | | |
| [9] | " " | " | | 120.° | |
| [10] | " " | | 1.08005, 0.° | 117°3. | |
| [11] | " " | " | 1.06195, 17.° | 760 m. m. | |
| [12] | " " | " | 1.0635, 10.° | 116.° | 17.° |
| [13] | " " | " | 1.0607, 15.° | | |
| [14] | " " | " | 1.0563. | | |
| [15] | " " | " | 1.0565. 15°5. | | |
| [16] | " " | " | 1.0514, 20,° | 118.° | |
| [17] | Propionic acid. | $C_3 H_6 O_2$. | | 140.° | |
| [18] | " " | " | | 142.° | |
| [19] | " " | " | 1.0161, 0.° | 141°6. | |
| [20] | " " | " | .9911, 25°2. | 760 m. m. | |
| [21] | " " | " | .9963, 20.° | 140.° | |
| [22] | " " | " | .992, 18.° | 139.° | |
| [23] | Butyric " | $C_4 H_8 O_2$. | .9675, 25.° | | |
| [24] | " " | " | .963, 15.° | 164.° | |
| [25] | " " | " | | 164.° | |
| [26] | " " | " | .98862, 0.° | 157.° | |
| [27] | " " | " | .9739, 15.° m. of 2. | 760 m. m. | |
| [28] | " " | " | .98165, 0.° | 163.° | |
| [29] | " " | " | .973, 7.° | 156.° | |
| [30] | " " | " | .9673, 15.° | | |
| [31] | " " | " | .9610, 20.° | 162.° | |
| [32] | " " | " | .9850, 13°5. | 165.° | −12.°rs.−14.° |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Butyric acid. iso. | $C_4 H_8 O_2$. | .9598, 0.° | 153°5 to 154°5. | |
| [2] | " " " | " | .9208, 50.° | | |
| [3] | " " " | " | .8965, 100.° | | |
| [4] | Valerianic acid. | $C_5 H_{10} O_2$. | .941, 14.° | | |
| [5] | " " | " | .932, 28.° | | |
| [6] | " " | " | .944, 10.° | | |
| [7] | " " | " | .930, 12°5. | | |
| [8] | " " | " | .937, 16°5. | 175.° | |
| [9] | " " | " | | 175. | |
| [10] | " " | " | .9403, 15.° | 175.° | |
| [11] | " " | " | .9555, 0.° | 175°8. | |
| [12] | " " | " | .9378, 19°6. | 760 m. m. | |
| [13] | " " | " | .935, 15.° | 174°5. | |
| [14] | " " | " | .9558, 15.° | | |
| [15] | " " | " | .9313, 20.° | 174.° | |
| [16] | " " | " | .9577, 0.° | | |
| [17] | " " | " | .9415, 20.° | 185.° | |
| [18] | " " | " | .9284, 40.° | 736 m. m. | |
| [19] | " " | " | .9034, 99°3. | | |
| [20] | Caproic " | $C_6 H_{12} O_2$. | .922, 26.° | | |
| [21] | " " | " | .931, 15.° | 202°–209.° | |
| [22] | " " | " | | 198.° | |
| [23] | " " | " | | 198.° | |
| [24] | " " | " | .9252, 20.° | 199.° | |
| [25] | " " | " | .925, 27.° | 187°–198.° | |
| [26] | " " | " | .9449, 0.° | 204°5 to 205.° | |
| [27] | " " | " | .9294, 20.° | | |
| [28] | " " | " | .9172, 40.° | | |
| [29] | " " | " | .8947, 99°1. | 738.5 m. m. | |
| [30] | Oenanthylic acid. | $C_7 H_{14} O_2$. | | 212.° | |
| [31] | " " | " | .9167, 24.° | 218.° (?) | |
| [32] | " " | " | .9179, 18.° | 219.° | |
| [33] | " " | " | .9175, 20.° | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Caprylic acid. | $C_8 H_{16} O_2$. | .911, 20.° | 236°–240.° | 14°–15.° |
| [2] | " " | " | .905, 21.° | 238.° | 5.° rs. 3.° |
| [3] | " " | " | .901, 18.° | | 13.° rs. 9.° |
| [4] | Pelargonic " | $C_9 H_{18} O_2$. | | 260.° | 10.° |
| [5] | " " | " | .903, 21.° | 255.° | 18.° rs. 13.° |
| [6] | " " | " | | 248°–250.° | 7.° s. 0.° |
| [7] | Rutylic " | $C_{10} H_{20} O_2$. | | | 30.° |
| [8] | " " | " | | | 27°2. |
| [9] | " " l. | " | .930, 37.° | 264.° | 29°5. s. 28.° |
| [10] | Lauric " | $C_{12} H_{24} O_2$. | | | 42°–43.° |
| [11] | " " | " | | | 43.° |
| [12] | " " | " | .883, 20.° s. | | 42°–43.° |
| [13] | " " | " | | | 43°8. |
| [14] | " " | " | | | 45.° |
| [15] | " " | " | | | 43°6. |
| [16] | " " | " | | | 43°5. |
| [17] | Myristic " | $C_{14} H_{28} O_2$. | | | 53°8. |
| [18] | " " | " | | | 53°8. |
| [19] | " " | " | | | 53.° |
| [20] | Benomargaric acid. | $C_{15} H_{30} O_2$. | | | 52°–53.° |
| [21] | Isocetic " | " | | | 55.° |
| [22] | Cetic " | " | | | 53°5. |
| [23] | Palmitic " | $C_{16} H_{32} O_2$. | | | 61.° s. 59.° |
| [24] | " " | " | | | 62.° |
| [25] | " " | " | | | 62.° |
| [26] | Margaric " | $C_{17} H_{34} O_2$. | | | 52°3. s. 50°5. |
| [27] | " " | " | | | 59°9. |
| [28] | " " | " | | | 60.° |
| [29] | Stearic " | $C_{18} H_{36} O_2$. | 1.01, 0.° s. | | |
| [30] | " " | " | .854. l. | | |
| [31] | " " | " | | | 68. s. 65°8. |
| [32] | " " | " | | | 69°–69°2. |
| [33] | " " | " | | | 69°2. |
| [34] | " " | " | a. 1.00, 9.° | | 70.° |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Stearic acid. | $C_{18} H_{36} O_2$. | | | 69.° |
| [2] Arachidic acid. | $C_{20} H_{40} O_2$. | | | 75.° s. 73°5. |
| [3] Benostearic acid. | $C_{22} H_{44} O_2$. | | | 76.° |
| [4] Cerotic « | $C_{27} H_{54} O_2$. | | | 78°–79.° |
| [5] « « | « | | | 81°–82.° |
| [6] Melissic « | $C_{30} H_{60} O_2$. | | | 88°–89.° |

## 4th. ANHYDRIDES OF THE FORMIC SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [7] Acetic anhydride. | $C_4 H_6 O_3$. | 1.073, 20°5. | 137°5. | |
| [8] « « | « | 1.0969, 0.° | 138.° | |
| [9] « « | « | 1.0799, 15°2. | | |
| [10] « « | « | 1.075, 15.° | | |
| [11] « « | « | | 137.° | |
| [12] Propionic « | $C_6 H_{10} O_3$. | | 165.° | |
| [13] « « | « | 1.01, 18.° | 164°–166.° | |
| [14] Butyric « | $C_8 H_{14} O_3$. | .978, 12°5. | a. 190.° | |
| [15] Valeric « | $C_{10} H_{18} O_3$. | | 215.° | |
| [16] « « | « | .934, 15.° | | |
| [17] Œnanthylic anhydride | $C_{14} H_{26} O_3$. | .91, 14.° | | |
| [18] Caprylic « | $C_{16} H_{30} O_3$. | | a. 280.° | |
| [19] Pelargonic « | $C_{18} H_{34} O$. | | | 5.° |
| [20] Palmitic « | $C_{32} H_{64} O_3$. | | | 53°8. |

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## 5th. ETHERS OF THE SERIES $C_n$. $H_{2n}$. $O_2$.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Methyl formate. | $C_2 H_4 O_2$. | | 36°–38.° | |
| [2] | " " | " | | 32°9. | |
| [3] | " " | " | .9984, 0.° | | |
| [4] | " " | " | .9776, 15°3. | 33°4. | |
| [5] | " " | " | .9766, 16.° | 760 m. m. | |
| [6] | Ethyl " | $C_3 H_6 O_2$. | .9157, 18.° | | |
| [7] | " " | " | .912. | 53°4. | |
| [8] | " " | " | | 54.° | |
| [9] | " " | " | | 56.° | |
| [10] | " " | " | .9394, 0.° | | |
| [11] | " " | " | .9188, 17.° | | |
| [12] | " " | " | .94474, 0.° | 54°9. | |
| [13] | " " | " | .92544, 15°7. | 760 m. m. | |
| [14] | " " | " | | 54°3. | |
| [15] | " " | " | .9577, 0.° | | |
| [16] | " " | " | .93565, 0.° | 52°9. | |
| [17] | " " | " | | 53.° | |
| [18] | " " | " | .917. | 55°5. | |
| [19] | Propyl " | $C_4 H_8 O_2$. | .9197, 0.° | | |
| [20] | " " | " | .877, 38°5. | 82°5–83.° | |
| [21] | " " | " | .836, 72°5. | | |
| [22] | " " | " | .9188, 0.° | | |
| [23] | " " | " | .8761, 38°5. | 82°5–83.° | |
| [24] | " " | " | .835, 72°5. | | |
| [25] | Butyl " | $C_5 H_{10} O_2$. | | a. 100.° | |
| [26] | " " | " | .8845, 0.° | | |
| [27] | " " | " | .850, 34.° | 98°5. | |
| [28] | " " | " | .8224, 59°8. | | |
| [29] | " " | " | .7962, 83°4. | | |
| [30] | Amyl " | $C_6 H_{12} O_2$. | .884, 15.° | 114.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Amyl formate. | $C_6 H_{12} O_2$. | .8945, 0.° | 112.° | |
| [2] | " " | " | .8743, 21.° | | |
| [3] | " " | " | .8809, 15.° | | |
| [4] | Methyl acetate. | $C_3 H_6 O_2$. | .919, 22.° | 58.° | |
| [5] | " " | " | | 56°2. | |
| [6] | " " | " | .9328, 0.° | | |
| [7] | " " | " | .9085, 21.° | | |
| [8] | " " | " | .9562, 0.° | 56°3. | |
| [9] | " " | " | .93735, 15°6. | 760 m. m. | |
| [10] | " " | " | | 55.° | |
| [11] | " " | " | .86684, 0.° | 59°5. | |
| [12] | Ethyl " | $C_4 H_8 O_2$. | .866, 7.° | 71.° | |
| [13] | " " | " | .89, 15.° | | |
| [14] | " " | " | | 74.° | |
| [15] | " " | " | .9051, 0.° | | |
| [16] | " " | " | .91046, 0.° m. of 2. | | |
| [17] | " " | " | .89277, 15°7. | 74°3. | |
| [18] | " " | " | .8926, 15°9. | 760 m. m. | |
| [19] | " " | " | .90691, 0.° | 74°14. | |
| [20] | " " | " | | 74°6. | |
| [21] | " " | " | .906, 17°5. | | |
| [22] | " " | " | .903, 17.° | 77°5. | |
| [23] | " " | " | .932, 20.° | 83.° | |
| [24] | " " Purest. | " | .9055, 17°5. | 78°–78°5. | |
| [25] | " " | " | .8922, 15.° | 74.° | |
| [26] | " " | " | .8981, 15.° | | |
| [27] | " " | " | .903, 0.° | 72°+. | |
| [28] | Propyl " | $C_5 H_{10} O_2$. | | a. 90.° | |
| [29] | " " | " | .910, 0.° | | |
| [30] | " " | " | .8635, 42°5. | 103.° | |
| [31] | " " | " | .8137, 84°6. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Propyl acetate. | $C_5 H_{10} O_2$. | .910, 0.° | 103.° | |
| [2] | " " | " | .8627, 42°.5. | | |
| [3] | " " | " | .8128, 84°.6. | | |
| [4] | " " | " | .913, 0.° | 102.° | |
| [5] | Butyl acetate. | $C_6 H_{12} O_2$. | .8845, 16.° | 114.° | |
| [6] | " " | " | | 111°–113.° | |
| [7] | " " | " | .892, 0.° | 111.° | |
| [8] | " " | " | .89096, 0.° | 117°.5. | |
| [9] | " " | " | .8747, 16.° | | |
| [10] | " " | " | .83143, 50.° | | |
| [11] | " " | " | .9000, 0.° | 125°.1. 740 m. m. | |
| [12] | " " | " | .8817, 20.° | | |
| [13] | " " | " | .8659, 40.° | | |
| [14] | " " | " | .9052, 0.° | 116°.5. 764 m. m. | |
| [15] | " " | " | .8668, 37°.1. | | |
| [16] | " " | " | .8328, 68°.9. | | |
| [17] | " " | " | .8096, 89°.4. | | |
| [18] | " " | " | .7972, 99°.75. | | |
| [19] | Amyl " | $C_7 H_{14} O_2$. | | 125.° | |
| [20] | " " | " | .8572, 21.° | 133°.3. | |
| [21] | " " | " | .8765, 0.° | | |
| [22] | " " | " | .8837, 0.° | 137°.6. | |
| [23] | " " | " | .8692, 15°.1. | | |
| [24] | " " | " | .863, 10.° | 133.° | |
| [25] | " " | " | .8762, 15.° | | |
| [26] | " " | " | .8733, 15.° | 140.° | |
| [27] | " " | " | .8752, Two products. | | |
| [28] | " " | " | .8963, 0.° | 148°.4. 737 m. m | |
| [29] | " " | " | .8792, 20.° | | |
| [30] | " " | " | .8645, 40.° | | |
| [31] | " " iso. | " | .9222, 0.° | 133°–135.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Hexyl acetate. | $C_8 H_{16} O_2$. | | 145.° | |
| [2] | " " | " | .8525, 0.° | 140°–145.° | |
| [3] | " " β. | " | .8778, 0.° | 155°–157.° | |
| [4] | " " | " | .8310, 50.° | 787 m. m. | |
| [5] | Heptyl " | $C_9 H_{18} O_2$. | .8868, 19.° | | |
| [6] | " | " | .8707, 16°5. | 178°–180.° | |
| [7] | " " | " | .8605, 16.° | 180°–182.° | |
| [8] | " " | " | | 180.° | |
| [9] | Octyl " | $C_{10} H_{20} O_2$. | | 193.° | |
| [10] | " " | " | | 191°–192.° | |
| [11] | " " | " | | 190°–195.° | |
| [12] | " " | " | | 200°–205.° | |
| [13] | " " | " | .8717, 16.° | 206°–208.° | |
| [14] | Nonyl " | $C_{11} H_{22} O_2$. | | 208°–212.° | |
| [15] | Cetyl " | $C_{18} H_{36} O_2$. | .858, 20.° | 222°–225.° | 18°5. |
| [16] | Ethyl propionate. | $C_5 H_{10} O_2$. | | 101.° | |
| [17] | " " | " | .9231, 0.° | 93°2–98.° | |
| [18] | " " | " | .8949, 26°3. | | |
| [19] | " " | " | .9137, 0.° | | |
| [20] | " " | " | .863, 45°1. | 100.° | |
| [21] | " " | " | .817, 83.° | 760 m. m. | |
| [22] | " " | " | .9139, 0.° | | |
| [23] | " " | " | .8625, 45°1. | 100.° | |
| [24] | " " | " | .816, 83.° | | |
| [25] | Propyl " | $C_6 H_{12} O_2$. | .903, 0.° | | |
| [26] | " " | " | .857, 51°27. | 124°3. | |
| [27] | " " | " | .795, 100°6. | 760 m. m. | |
| [28] | " " | " | .785, 108°34. | | |
| [29] | " " | " | .9022, 0.° | | |
| [30] | " " | " | .8498, 51°27. | 123°5–125.° | |
| [31] | " " | " | .7944, 100°6. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Propyl propionate. | $C_6 H_{12} O_2$. | .7839, 108°34. | | |
| [2] | Butyl " | $C_7 H_{14} O_2$. | .8934, 0.° | | |
| [3] | " " | " | .8445, 49°2. | 135°7. | |
| [4] | " " | " | .7903, 100°15. | 764 m. m. | |
| [5] | " " | " | .7705, 116°5. | | |
| [6] | " " | " | .8926, 0.° | | |
| [7] | " " | " | .8437, 49°2. | 135°7. | |
| [8] | " " | " | .7896, 100°15. | | |
| [9] | " " | " | .7698, 116°5. | | |
| [10] | Amyl " | $C_8 H_{16} O_2$. | | 155.° | |
| [11] | Methyl butyrate. | $C_5 H_{10} O_2$. | | 93.° | |
| [12] | " " | " | .92098, 0.° | 95°9. | |
| [13] | " " | " | .9045, 15°5.° | 760 m. m. | |
| [14] | " " | " | 1.02928, 0.° | 102°1. | |
| [15] | " " | " | | 93.° | |
| [16] | " " | " | .9091, 0.° | | |
| [17] | " " | " | .8793, 30°3. | | |
| [18] | Ethyl " | $C_6 H_{12} O_2$. | | 110.° | |
| [19] | " " | " | | 110.° | |
| [20] | " " | " | .90412, 0.° | 114°8. | |
| [21] | " " | " | .89065, 13.° | 760 m. m. | |
| [22] | " " | " | .90193, 0.° | 119.° | |
| [23] | " " | " | | 113.° | |
| [24] | " " | " | .8894, 15.° | | |
| [25] | Propyl " | $C_7 H_{14} O_2$. | | a. 130.° | |
| [26] | " " | " | .888, 0.° | | |
| [27] | " " | " | .841, 47°25. | 137°25. | |
| [28] | " " | " | .785, 100°25. | 765 m. m. | |
| [29] | " " | " | .753, 128°75. | | |
| [30] | " " | " | .8872, 0.° | | |
| [31] | " " | " | .8402, 47°24. | 135°25. | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| 1 | Propyl butyrate. | $C_7 H_{14} O_2$. | .7842, 100°25. | | |
| 2 | " " | " | .7525, 128°75. | | |
| 3 | " " iso. | " | .8787, 0.° | 128.° | |
| 4 | " " " | " | .8652, 13.° | 755 m. m. | |
| 5 | Butyl " | $C_8 H_{16} O_2$. | .872, 0.° | | |
| 6 | " " | " | .8245, 51°8. | | |
| 7 | " " | " | .776, 99°6. | 149°5. | |
| 8 | " " | " | .7445, 128°3. | 758 m. m. | |
| 9 | " " | " | .8885, 0.° | | |
| 10 | " " | " | .8717, 20.° | 165°5. | |
| 11 | " " | " | .8579, 40.° | 735.7 m. m. | |
| 12 | " " | " | .8719, 0.° | | |
| 13 | " " | " | .8238, 50°8. | 149°5. | |
| 14 | " " | " | .7753, 99°8. | | |
| 15 | " " | " | .7439, 128°3. | | |
| 16 | Amyl " | $C_9 H_{18} O_2$. | .8683, 15.° | | |
| 17 | " " | " | .852, 15.° | 176.° | |
| 18 | " " | " | .8769, 0.° | | |
| 19 | " " | " | .8264, 55°4. | 170°3. | |
| 20 | " " | " | .7839, 100°2. | 760 m. m. | |
| 21 | " " | " | .7446, 139°5. | | |
| 22 | Cetyl " | $C_{20} H_{40} O_2$. | .856, 20.° l. | 260°–270.° | 20.° rs. 15.° |
| 23 | Methyl valerate. | $C_6 H_{12} O_2$. | .8960, 0.° | | |
| 24 | " " | " | .8806, 16.° | 114°–115.° | |
| 25 | " " | " | .901525, 0.° | | |
| 26 | " " | " | .88687, 15.° | 116°2. | |
| 27 | " " | " | .88662, 15°3. | 760 m. m. | |
| 28 | " " | " | .9005, 0.° | | |
| 29 | " " | " | .8581, 41°5. | 117°25.° | |
| 30 | " " | " | .8343, 64°3. | | |
| 31 | " " | " | .7945, 100°1. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Ethyl valerate. | $C_7 H_{14} O_2$. | .894, 13.° | 133°5. | |
| [2] | " " | " | .869, 14.° | 133°–134.° | |
| [3] | " " | " | .8829, 0.° | 131.° | |
| [4] | " " | " | .8659, 18.° | | |
| [5] | " " | " | .886, 0.° | 135°5. | |
| [6] | " " | " | .832, 55°7. | | |
| [7] | " " | " | .7843, 99°63. | 760 m. m. | |
| [8] | " " | " | .7582, 122°5. | | |
| [9] | Propyl " | $C_8 H_{16} O_2$. | .887, 0.° | 157.° | |
| [10] | " " | " | .8395, 50°8. | | |
| [11] | " " | " | .7915, 100°15. | 761 m. m. | |
| [12] | " " | " | .776, 113°7. | | |
| [13] | " " | " | .8862, 0.° | 157.° | |
| [14] | " " | " | .8387, 50°8. | | |
| [15] | " " | " | .7906, 100°15. | | |
| [16] | " " | " | .7755, 113°7. | | |
| [17] | " " iso. | " | .8702, 0.° | 142.° | |
| [18] | " " " | " | .8538, 17.° | 756 m. m. | |
| [19] | Butyl " | $C_9 H_{18} O_2$. | .8884, 0.° | 173°4. | |
| [20] | " " | " | .8438, 49°7. | 760 m. m. | |
| [21] | " " | " | .7966, 100.° | | |
| [22] | " " | " | .7428, 155°8. | | |
| [23] | Amyl " | $C_{10} H_{20} O_2$. | | a. 196.° | |
| [24] | " " | " | .8793, 0.° | 188.° | |
| [25] | " " | " | .8645, 17°7. | | |
| [26] | " " | " | .8596, 15.° | | |
| [27] | " " | " | .874, 0.° | 190.° | |
| [28] | " " | " | .832, 50°67. | | |
| [29] | " " | " | .787, 100.° | | |
| [30] | " " | " | .740, 149°5. | | |
| [31] | Octyl " | $C_{13} H_{26} O_2$. | .8624, 16.° | 249°–251.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Cetyl-valerate. | $C_{21} H_{42} O_2$. | .852, 20.° l. | 280°–290.° 202 m. m. | 25.° rs. 20.° |
| [2] Methyl caproate. | $C_7 H_{14} O_2$. | .8977, 18.° | 150.° | |
| [3] Ethyl " | $C_8 H_{16} O_2$. | | 120.° | |
| [4] " " | " | .882, 18.° | 162.° | |
| [5] Amyl " | $C_{11} H_{22} O_2$. | | 211.° | |
| [The so-called œnanthic ether of Pelouze and Liebig, (see A. C. P. 19. 241.), is omitted on account of its uncertain character. See Delffs, pelargonic ether.] | | | | |
| [6] Methyl caprylate. | $C_9 H_{18} O_2$. | .882. | | |
| [7] Ethyl " | $C_{10} H_{20} O_2$. | .8738, 15.° | 214.° | |
| [8] " " | " | .8728, 16.° | 204°–206.° | |
| [9] Octyl " | $C_{16} H_{32} O_2$. | .8625, 16.° | 297°–299.° | |
| [10] Ethyl pelargonate. | $C_{11} H_{22} O_2$. | .86. | 216°–218.° | |
| [11] " " (?) | " | .8725, 15°5. | 224.° | |
| [12] Methyl rutylate. | " | | 223°–224.° | |
| [13] Ethyl " | $C_{12} H_{24} O_2$. | .862. | | |
| [14] " " | " | | 243°–245.° | |
| [15] Ethyl laurate. | $C_{14} H_{28} O_2$. | .86, 20.° | 264.° | s.—10.° |
| [16] " " | " | .8671, 19.° | 269.° | |
| [17] Ethyl myristate. | $C_{16} H_{32} O_2$. | .864. l. | | |
| [18] Methyl palmitate. | $C_{17} H_{34} O_2$. | | | 28.° s. 22.° |
| [19] Ethyl " | $C_{18} H_{36} O_2$. | | | 24°2. |
| [20] " " | " | | | 21°5. s. 18.° |
| [21] Amyl " | $C_{21} H_{42} O_2$. | | | 13°5. |
| [22] " " | " | | | 9.° |
| [23] Myricyl " | $C_{46} H_{92} O_2$. | | | 71°5–72.° |
| [24] Methyl stearate. | $C_{19} H_{38} O_2$. | | | 38.° |
| [25] Ethyl " | $C_{20} H_{40} O_2$. | | | 27.° |
| [26] " " | " | | | 30°–31.° |
| [27] " " | " | | | 32.° |
| [28] " " | " | | | 31.° |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ethyl stearate. | $C_{20}H_{40}O_2$. | | | 33°3. |
| [2] " " | " | | | 33°7. |
| [3] " " | " | | | 33°7. |
| [4] " " | " | | | 32°9. |
| [5] Amyl " | $C_{25}H_{46}O_2$. | | | 25°5. |
| [6] " " | " | | | 25.° (?) |
| [7] Octyl " | $C_{26}H_{52}O_2$. | | | 45.° (?) |
| [8] Cetyl " | $C_{34}H_{68}O_2$. | | | 55°–60.° |
| [9] Methyl arachidate. | $C_{21}H_{42}O_2$. | | | 54°–54°5. |
| [10] Ethyl " | $C_{22}H_{44}O_2$. | | | 52°5. s. 51.° |
| [11] Amyl " | $C_{25}H_{50}O_2$. | | | 44°8–45.° |
| [12] Ethyl benostearate. | $C_{24}H_{48}O_2$. | | | 48°–49.° |
| [13] Ethyl cerotate. | $C_{29}H_{58}O_2$. | | | 60°3. |
| [14] Ceryl " | $C_{54}H_{108}O_2$. | | | 82.° |

## 6th. ALDEHYDES OF THE SERIES $C_n H_{2n} O$.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [15] Acetic aldehyde. | $C_2 H_4 O$. | .7900, 18.° | 21°8. | |
| [16] " " | " | .79442, 5°1. | | |
| [17] " " | " | .79388, 5°6. | 20°8. | |
| [18] " " | " | .80092, 0.° | 760 m. m. | |
| [19] " " | " | .80551, 0.° | 22.° | |
| [20] " " | " | .796, 15.° | 23°–28.° | |
| [21] Isomer of aldehyde. | " | 1.033, 0.° | 110.° | |
| [22] Paraldehyde. | " | | 123°–124.° | 12.° |
| [23] " | " | .998, 15.° | 124.° | 10°5. s. 10.° |
| [24] Elaldehyde. | " | | 94.° | 2.° rs. 0.° |
| [25] Propionic aldehyde. | $C_3 H_6 O$. | .790, 15.° | 55°–60.° | |
| [26] " " | " | .8284, 0.° | 54°–63.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Propionic aldehyde. | $C_3 H_6 O$. | .8327, 0.° | | |
| [2] | " " | " | .8201, 9°7. | 46.° | |
| [3] | " " | " | .7906, 32°6. | | |
| [4] | " " | " | .804, 17.° | 49°5. | |
| [5] | " " | " | .832, 0.° | | |
| [6] | " " | " | .8192, 9°7. | 46.° | |
| [7] | " " | " | .7898, 32°6. | | |
| [8] | Butyric " | $C_4 H_8 O$. | .80, 15.° | 68°–73.° | |
| [9] | " " | " | .8341, 0.° | 73°–77.° | |
| [10] | " " | " | .8226, 0.° | | |
| [11] | " " | " | .7919, 27°75. | 62.° | |
| [12] | " " | " | .7638, 50°4. | | |
| [13] | " " | " | | a. 75. | |
| [14] | " " | " | .8618, 0.° | | |
| [15] | " " | " | .7911, 27°75. | 62.° | |
| [16] | " " | " | .763, 50°4. | | |
| [17] | Valeric " | $C_5 H_{10} O$. | .818. | | |
| [18] | " " | " | .820, 22.° | a. 110.° | |
| [19] | " " | " | .8009, 20.° | a. 90.° | |
| [20] | " " | " | .8224, 0.° | 92°8. | |
| [21] | " " | " | .8057, 17°4. | | |
| [22] | " " | " | .822, 0.° | | |
| [23] | " " | " | .779, 43°4. | 92°5. | |
| [24] | " " | " | .749, 71°9. | | |
| [25] | " " | " | .8209, 0.° | | |
| [26] | " " | " | .778, 43°4. | | |
| [27] | " " | " | .7485, 71°9. | | |
| [28] | Hexyl " $\beta$. | $C_6 H_{12} O$. | .8298, 0.° | 127.° | |
| [29] | " " " | " | .7846, 50.° | 761.2 m. m. | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Isomer of hexyl aldehyde. | $C_6 H_{12} O.$ | .842. 15.° | 180°–185.° | |
| [2] Œnanthol. | $C_7 H_{14} O.$ | .8271, 7.° | 155°–158.° | |
| [3] " | " | | 155°–156.° | |
| [4] " | " | | 155.° | |
| [5] " | " | | 151°–152.° | |
| [6] " | " | .827, 17.° | 155°–156.° | |
| [7] Isomer of œnanthol. | " | .835, 14.° | 161°–164.° | |
| [8] Octyl aldehyde. | $C_8 H_{16} O.$ | .818, 19.° | 171.° | |
| [9] " " | " | .820. | 178.° | |
| [10] Euodyl " * | $C_{11} H_{22} O.$ | .8497, 15.° | 213.° | s. 7.° |
| [11] Lauryl " | $C_{22} H_{24} O.$ | | 232.° | |
| [12] Cetyl " | $C_{16} H_{32} O.$ | | | 46°–47.° |
| [13] Palmityl " | " | | | 52.° |

## 7. ACETONES. GENERAL FORMULA $C_n H_{2n} O.$

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [14] Acetone. | $C_3 H_6 O.$ | | 56.° | |
| [15] " | " | .7921, 18.° | 55°6. | |
| [16] " | " | .8144, 0.° | 56°3. | |
| [17] " | " | .79945, 13°5. | 760 m. m. | |
| [18] " | " | | 55°–56.° | |
| [19] " | " | .790, 15.° | 56°–57.° | |
| [20] Methyl acetone. | $C_4 H_8 O.$ | .838, 19.° | 75°–77.° | |
| [21] " " | " | .8125, 13.° | 81.° | |
| [22] " " | " | .824, 0.° | 79°5–81.° | |
| [23] " " | " | .8063. 15°3. | 77°–79.° | |
| [24] Acetyl ethyl. | " | | 77°5–78.° | |
| [25] Butyral. | " | .821, 22.° | 95.° | |
| [26] Propione. | $C_5 H_{10} O.$ | | 110.° | |
| [27] " | " | | 111.° | |

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* Probably an acetone. Compare with methyl caprinal.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Propione. | $C_5 H_{10} O.$ | .811, 11°5. | 101.° | |
| [2] " | " | .8145, 0.° | 101.° | |
| [3] " | " | .8015, 15.° | | |
| [4] " | " | | 100°–101.° | |
| [5] " | " | .8078, 18°5. | 99°–101.° | |
| [6] Methyl butyral. | " | .827, 0.° | 111.° | |
| [7] Ethyl acetone. | " | .842, 19.° | 90°–95.° | |
| [8] " " | " | .8132, 13.° | 101.° | |
| [9] " " | " | .8040, 22.° | | |
| [10] Dimethyl acetone. | " | .8099, 13.° | 93°5. | |
| [11] Ethyl butyral. | $C_6 H_{12} O.$ | .833, 0.° | 128.° | |
| [12] Isopropacetone. | " | .81892, 0.° | 114.° | |
| [13] Methyl valeral. | " | | 120.° | |
| [14] Butyrone. | $C_7 H_{14} O.$ | .830. | 144.° | |
| [15] " | " | | 145.° | |
| [16] Diethyl acetone. | " | .8171, 22.° | 137°5–139.° | |
| [17] Methyl amyl acetone. | " | .828—.829. | 144.° | |
| [18] Methyl butyrone. | $C_8 H_{16} O.$ | .827, 16.° | 180.° | |
| [19] Methyl œnanthol. | " | .817, 23.° | 171°–171°5. | |
| [20] Valerone. | $C_9 H_{18} O.$ | | 164°–166.° | |
| [21] Caprone. | $C_{11} H_{22} O.$ | | 165.° | |
| [22] Butyl butyrone. | " | .828, 20.° | 222.° | s. 12.° |
| [23] Methyl caprinol.* | " | .8295, 17°5. | 224.° | s. 5° to 6.° |
| [24] " " | " | .8281, 18°7. | | |
| [25] " " | " | .8268, 20°5. | 225°–226.° | 15.° rs. 6.° |
| [26] Œnanthone. | $C_{13} H_{26} O.$ | .825, 30.° | 264.° | 30.°rs.29°5. |
| [27] Caprylone. | $C_{15} H_{30} O.$ | | 278.° | 40.° s. 38.° |
| [28] Caprinone. | $C_{19} H_{38} O.$ | | | 58.° s. 56.° |
| [29] Laurone. | $C_{23} H_{46} O.$ | | | 66.° |
| [30] Myristone. | $C_{27} H_{54} O.$ | | | 75.° |
| [31] Palmitone. | $C_{31} H_{62} O.$ | | | 84.° s. 80.° |

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* Compare Methyl caprinol with Euodyl aldehyde.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Stearone. | $C_{35}\ H_{70}\ O.$ | | | 86.° |
| [2] " | " | | | 87°8. |

## 8th. OXIDES OF THE ETHYLENE SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [3] Ethylene oxide. | $C_2\ H_4\ O.$ | .8945, 0.° | 13°5. | |
| [4] Propylene " | $C_3\ H_6\ O.$ | .859, 0.° | 35.° | |
| [5] Amylene " | $C_5\ H_{10}\ O.$ | .824, 0.° | 95.° | |
| [6] Octylene " | $C_8\ H_{16}\ O.$ | .831, 15.° | 145.° | |
| [7] Diamylene " | $C_{10}\ H_{20}\ O.$ | | 170°–180.° | |
| [8] " " | " | .9402, 0.° | 180°–190.° | |
| [9] Dioxethylene. | $C_4\ H_8\ O_2.$ | | | |
| [10] Ethylene ethylidene oxide. | " | 1.0482, 0.° | 102.° | 9.° |
| | " | 1.0002, 0.° | 82°5. | |

## 9th. GLYCOLS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [11] Ethylene glycol. | $C_2\ H_6\ O_2.$ | 1.125, 0.° | 197°–197°5. | |
| [12] " " | " | | 193.° | |
| [13] Propylene " | $C_3\ H_8\ O_2.$ | 1.051, 0.° | 188.° | |
| [14] " " | " | 1.038, 23.° | | |
| [15] Butylene " | $C_4\ H_{10}\ O_2.$ | 1.048, 0.° | 183°–184.° | |
| [16] Amylene " | $C_5\ H_{12}\ O_2.$ | .987, 0.° | 177.° | |
| [17] Hexylene " | $C_6\ H_{14}\ O_2.$ | .9669, 0.° | 207.° | |
| [18] Octylene " | $C_8\ H_{18}\ O_2.$ | .932, 0.° | 235°–240.° | |
| [19] " " | " | .920, 29.° | | |

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## 10th. MISCELLANEOUS COMPOUNDS OF THE ETHYLENE SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ethylene diethylate. | $C_6 H_{14} O_2$. | .7993, 0.° | 123°5. | |
| [2] Amylene ethylate. | $C_7 H_{16} O$. | .759, 21.° | 102°–103.° | |
| [Compare the above with ethyl amyl oxide.] | | | | |
| [3] Amylene hydrate. | $C_5 H_{12} O$. | .829, 0. | 105°–108.° | |
| [4] Diamylene " | $C_{10} H_{22} O$. | .909, 0.° | 163.° | |
| [5] Octylene " | $C_8 H_{18} O$. | .811, 0.° | 174°–178.° | |
| [6] " " | " | .793, 23.° | | |
| [Compare amylene and octylene hydrates with amyl and octyl alcohols.] | | | | |
| [7] Diethylene alcohol. | $C_4 H_{10} O_3$. | | 245.° | |
| [8] " " | " | 1.132, 0.° | a. 250.° | |
| [9] Triethylene " | $C_6 H_{14} O_4$. | | 285°–290.° | |
| [10] " " | " | 1.138. | a. 290.° | |
| [11] Tetrethylene " | $C_8 H_{18} O_5$. | | 230? 25 m.m. | |
| [12] Pentethylene " | $C_{10} H_{22} O_6$. | | 281° 25 m.m. | |
| [13] Hexethylene " | $C_{12} H_{26} O_7$. | | 325° 25 m.m. | |
| [14] Ethylene monacetate. | $C_4 H_8 O_3$. | | 181°–182.° | |
| [15] " diacetate. | $C_6 H_{10} O_4$. | 1.128, 0.° | 186°–187.° | |
| [16] Diethylene " | $C_8 H_{14} O_5$. | | 245°–255.° | |
| [17] Triethylene " | $C_{10} H_{18} O_6$. | | a. 300.° | |
| [18] Tetrethylene " | $C_{12} H_{22} O_7$. | | 320°+. | |
| [19] Ethylene monobutyrate | $C_6 H_{12} O_3$. | | a. 220.° | |
| [20] " dibutyrate. | $C_{10} H_{18} O_4$. | 1.024, 0.° | 239°–241.° | |
| [21] " monovalerate. | $C_7 H_{14} O_3$. | | a. 240.° | |
| [22] " divalerate. | $C_{12} H_{22} O_4$. | | a. 255.° | |
| [23] " aceto-butyrate. | $C_8 H_{14} O_4$. | | 208°–215.° | |
| [24] " aceto-valerate. | $C_9 H_{16} O_4$. | | a. 230.° | |
| [25] " distearate. | $C_{38} H_{74} O_4$. | | | 76.° |
| [26] Propylene diacetate. | $C_7 H_{12} O_4$. | 1.109, 0.° | 186.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Butylene diacetate. | $C_8 H_{14} O_4$. | | a. 200.° | |
| [2] Hexylene " | $C_{10} H_{18} O_4$. | 1.014, 0.° | 215°–220.° | |
| [3] Octylene " | $C_{12} H_{22} O_4$. | | 240°–245.° | |
| [4] " " | " | | 245°–250.° | |
| [5] Butylene acetate. | $C_6 H_{12} O_2$. | | 111°–113.° | |
| [6] Octylene acetate. | $C_{10} H_{20} O_2$. | .822, 0.° | 163°–180.° | |
| [7] " " | " | .803, 26.° | | |
| [Compare the two last with the acetates of butyl and octyl.] | | | | |

## 11th. ACIDS. LACTIC AND OXALIC SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [8] Glycollic acid. | $C_2 H_4 O_3$. | | | 78°–79.° |
| [9] Lactic " | $C_3 H_6 O_3$. | 1.215, 10.° | | |
| [10] Leucic " | $C_6 H_{12} O_3$. | | | 73.° |
| [11] Oxalic acid. Sublimed. | $C_2 H_2 O_4$. | 2.00, 9.° | | |
| [12] " " Crystallized. | $C_2H_2O_4.2H^2O$ | 1.507. | | |
| [13] " " " | " | 1.622. | | |
| [14] " " " | " | 1629. | | |
| [15] " " " | " | 1.63, 9.° | | |
| [16] " " " | " | | | a. 98.° |
| [17] Succinic acid. | $C_4 H_6 O_4$. | 1.55. | | |
| [18] " " Sublimed. | " | 1. 529, 9.° | | |
| [19] " " Crystallized. | " | 1.552, 9.° | | |
| [20] " " | " | | 235.° d. | 180.° |
| [21] Pyrotartaric acid. | $C_5 H_8 O_4$. | | 190°+. | 100.°+. |
| [22] " " | " | | | 110°–112°5. |
| [23] " " | " | | | 111°–112.° |
| [24] Adipic " | $C_6 H_{10} O_4$. | | | 145.° |
| [25] Pimelic " | $C_7 H_{12} O_4$. | | | 134.° |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Pimelic acid. | $C_7 H_{12} O_4$. | | | 114.° |
| [2] Suberic " | $C_8 H_{14} O_4$. | | | 120.° |
| [3] " " | " | | | 140.° rs. 138°5. |
| [4] Anchoic, Azelaic, or | $C_9 H_{16} O_4$. | | | 114°–116.° |
| [5] Lepargylic acid. | " | | | 115°–124.° |
| [6] " " | " | | | 106.° rs. 104.° |
| [7] Sebacic " | $C_{10} H_{18} O_4$. | 1.1317, melted. | | 127.° |
| [8] Roccellic " | $C_{17} H_{32} O_4$. | | | 132.° s. 108.° |

## 12th. CARBONATES, LACTATES, AND LEUCATES, OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [9] Ethyl carbonate. | $C_4 H_{10}. C O_3$. | | 125.° | |
| [10] " " | " | | 126.° | |
| [11] " " | " | .975, 19.° | 125°–126.° | |
| [12] " " | " | .9998, 0.° | 123°5 to | |
| [13] " " | " | .9780, 20.° | 125°8. | |
| [14] Butyl " | $C_8 H_{18}. C O_3$. | | 190.° | |
| [15] Amyl " | $C_{10} H_{22}. C O_3$. | .9144. | 224.° | |
| [16] " " | " | .9065, 15°5. | 226.° | |
| [17] Ethyl ortho carbonate. | $C_9 H_{20} O_4$. | .925. | 158°–159.° | |
| [18] " lactate. | $C_5 H_{10} O_3$. | 1.0542, 0.° | 156.° | |
| [19] " " | " | 1.042, 13.° | 753 m. m. | |
| [20] Diethyl " | $C_7 H_{14} O_3$. | .9203, 0.° | 156°5 | |
| [For dilactates and trilactates, see "miscellaneous ethers."] | | | | |
| [21] Methyl leucate. | $C_7 H_{14} O_3$. | .9896, 16°5. | 165.° | |
| [22] Ethyl " | $C_8 H_{16} O_3$. | .9613, 18°7. | 175.° | |
| [23] Amyl " | $C_{11} H_{22} O_3$. | .93227, 13.° | 225.° | |

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## 13th. OXALATES, SUCCINATES, &c., OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Methyl oxalate. | $C_4 H_6 O_4$. | | 161.° | 51.° |
| [2] " " | " | | 163°5. | |
| [3] " " | " | 1.1566, 50.° | | |
| [4] Methyl-ethyl oxalate. | $C_5 H_8 O_4$. | 1.27, 12.° | 160°–170.° | |
| [5] Ethyl " | $C_6 H_{10} O_4$. | 1.0929, 7°5. | 183°–184.° | |
| [6] " " | " | 1.086, 12.° | 186.° | |
| [7] " " | " | 1.1016, 0.° | 186.° | |
| [8] " " | " | 1.0815, 18°2. | | |
| [9] " " | " | 1.0824, 15.° | | |
| [10] Amyl " | $C_{12} H_{22} O_4$. | | 262.° | |
| [11] " " | " | | 260.° | |
| [12] " " | " | .968, 11.° | 265.° | |
| [13] Methyl succinate. | $C_6 H_{10} O_4$. | 1.1179, 20.° | 198.° | 20.°s. 16.° |
| [14] Ethyl " | $C_8 H_{14} O_4$. | 1.036. | 214.° | |
| [15] " " | " | | 214.° | |
| [16] " " | " | 1.0718, 0.° | 217°3. | |
| [17] " " | " | 1.0475, 25°5. | | |
| [18] Isopropyl " | $C_{10} H_{18} O_4$. | 1.009, 0.° | 228.° | |
| [19] " " | " | .997, 18°5. | 761 m. m. | |
| [20] Cetyl " | $C_{36} H_{70} O_4$. | | | 58.° |
| [21] Ethyl pyrotartrate. | $C_9 H_{16} O_4$. | | 218.° | |
| [22] " adipate. | $C_{10} H_{18} O_4$. | 1.001, 20°5. | 230.° | |
| [23] " pimelate. | $C_{11} H_{20} O_4$. | | 185.° | |
| [24] Methyl suberate. | $C_{10} H_{18} O_4$. | 1.014, 18.° | 260.° | |
| [25] Ethyl " | $C_{12} H_{22} O_4$. | 1.003, 18.° | | |
| [26] " anchoate. | $C_{13} H_{24} O_4$. | | 325.° | |
| [27] Methyl sebate. | $C_{12} H_{22} O_4$. | | 285.° | 25°5. |
| [28] Ethyl " | $C_{14} H_{26} O_4$. | | 308.° | |

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## 14th. COMPOUNDS OF ALLYL AND DIALLYL.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Allyl alcohol. | $C_3 H_6 O$. | | 103.° | |
| [2] " " | " | | 92°–94.° | |
| [3] " " | " | | 93°–96.° | |
| [4] " " | " | .8581, 0.° | 90°–92.° | s.—50.° |
| [5] " " | " | .8478, 27.° | | |
| [6] " " | " | .8709, 0.° | | |
| [7] " " | " | .81832, 62.° | 96°–97.° | |
| [8] " " | " | .7846, 97.° | | |
| [9] " " | " | | 92°–95.° | |
| [10] Diallyl monohydrate. | $C_6 H_{12} O$. | .8367, 0.° | 93°–95.° | |
| [11] " dihydrate. | $C_6 H_{14} O_2$. | .9638, 0.° | 212°–215.° | |
| [12] " " | " | .9202, 65.° | | |
| [13] Pseudo diallyl alcohol. | $C_6 H_{12} O$. | .8604, 0.° | 140.° | |
| [14] " " " | " | .8625, 0.° | | |
| [15] Allyl oxide. | $C_6 H_{10} O$. | | 85°–87.° | |
| [16] " " | " | | 82.° | |
| [17] Ethyl allyl oxide. | $C_5 H_{10} O$. | | a. 64.° | |
| [18] " " " | " | | 62°5. | |
| [19] Amyl allyl " | $C_8 H_{16} O$. | | a. 120.° | |
| [20] Allyl formate. | $C_4 H_6 O_2$. | .9322, 17°5. | 82°–83.° | |
| [21] " acetate. | $C_5 H_8 O_2$. | | 97°–100.° | |
| [22] " " | " | | 105.° | |
| [23] " butyrate. | $C_7 H_{12} O_2$. | | a. 145.° | |
| [24] " " | " | | a. 140.° | |
| [25] " valerate. | $C_8 H_{14} O_2$. | | 162.° | |
| [26] Diallyl monacetate. | $C_8 H_{14} O_2$. | .912. | 150°–160.° | |
| [27] " diacetate. | $C_{10} H_{18} O_4$. | 1.009, 0.° | 225°–230.° | |
| [28] Ethyl allyl acetate. | | .9222, 0.° | 133°–135.° | |
| [29] Allyl oxalate. | $C_8 H_{10} O_4$. | 1.055, 15°5. | 206°–207.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Allyl benzoate. | $C_{10}H_{10}O_2$. | | 242.° | |
| [2] " " | " | | 230.° | |
| [3] " " | " | | 228.° | |

## 15th. GLYCERINE, GLYCERIDES, AND ALLIED COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [4] Glycerine. | $C_3H_8O_3$. | 1.27, 10.° | | |
| [5] " | | 1.28, 15.° | | |
| [6] " | " | 1.260, 15°5. | | |
| [7] " | " | 1.115, 12°5. | | |
| [8] " | " | 1.2636, 15.° | | |
| [9] " | " | 1.26949, 6°7. } | 290.° | |
| [10] " | " | 1.26244, 16°6. } | | |
| [11] Triethyl pyroglycerine | $C_{12}H_{26}O_5$. | 1.00, 14.° | 288°–290.° | |
| [12] Tetrethyl triglycerine. | $C_{17}H_{36}O_7$. | 1.022, 14.° | | |
| [13] Ethyl glycide. | $C_5H_{10}O_2$. | a. 1.00. | 128°–129.° | |
| [14] Amyl " | $C_8H_{16}O_2$. | .90, 20.° | 188.° | |
| [15] Aceto-glyceral. | $C_5H_{10}O_3$. | 1.081, 0.° | 184°–188.° | |
| [16] Valero-glyceral. | $C_8H_{16}O_3$. | 1.027, 0.° | 224°–228.° | |
| [17] Trimethyline. | $C_6H_{14}O_3$. | .9483, 0.° | 148.° | |
| [18] Monethyline. | $C_5H_{12}O_3$. | | 225°–230.° | |
| [19] Diethyline. | $C_7H_{16}O_3$. | .92. | a. 191.° | |
| [20] Triethyline. | $C_9H_{20}O_3$. | .8955, 15.° | 186.° | |
| [21] Ethyl amyline. | $C_{10}H_{22}O_3$. | .92. | 238°–240.° | |
| [22] Monamyline. | $C_8H_{18}O_3$. | .98, 20.° | 260°–262.° | |
| [23] Diamyline. | $C_{13}H_{28}O_3$. | .907, 9.° | 272°–274.° | |
| [24] Mono allyline. | $C_6H_{12}O_3$. | 1.1160, 0.° } | a. 240.° | |
| [25] " | " | 1.1013, 25.° } | | |
| [26] Monacetin. | $C_5H_{10}O_4$. | 1.20. | | |
| [27] Diacetin. Acetidin. | $C_7H_{12}O_5$. | 1.184. | 280.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Triacetin. | $C_9 H_{14} O_6$. | 1.174. | | |
| [2] Monobutyrin. | $C_7 H_{14} O_4$. | 1.088. | | |
| [3] Dibutyrin. Butyridin. | $C_{11} H_{20} O_5$. | 1.081. | | |
| [4] " " | " | 1.084. | | |
| [5] Tributyrin. | $C_{15} H_{26} O_6$. | 1.056. | | |
| [6] Monovalerin. | $C_8 H_{16} O_4$. | 1.100. | | |
| [7] Divalerin. | $C_{13} H_{24} O_5$. | 1.059. | | |
| [8] Laurostearin. | $C_{27} H_{52} O_5$. | | | 44°–45.° |
| [9] Cocinin. | $C_{42} H_{80} O_6$. | .92, 8.° s. | | |
| [10] Myristin. | $C_{45} H_{86} O_6$. | | | 31.° |
| [11] Monopalmitin. | $C_{19} H_{38} O_4$. | | | 58.° s. 45.° |
| [12] Dipalmitin. | $C_{35} H_{68} O_5$. | | | 59.° s. 51.° |
| [13] Tripalmitin. | $C_{51} H_{98} O_6$. | | | 60.° s. 46.° |
| [14] " 1st. modification | " | | | 46.° |
| [15] " 2d. " | " | | | 61°7. s. 45°5. |
| [16] " 3d. " | " | | | 62°8. |
| [17] Monostearin. | $C_{21} H_{42} O_4$. | | | 61.° s. 60.° |
| [18] Distearin. [tion. | $C_{39} H_{76} O_5$. | | | 58.° s. 55.° |
| [19] Tristearin. 1st. modifica- | $C_{57} H_{110} O_6$. | .987, 10.° | | 60.° |
| [20] " " " | " | .9872, 15.° | | 65.° |
| [21] " " " | " | .9877, 15.° | | 65°5. |
| [22] " " " | " | .9867, 15.° | | 69°7. |
| [23] " " " | " | .9600, 51°5. | | |
| [24] " 2d. " | " | 1.0101, 15.° | | 69°7. |
| [25] " 3d. " | " | 1.0178, 15.° | | 69°7. |
| [26] " " " | " | 1.0179, 15.° | | |
| [27] " " " | " | 1.009, 51°5. | | s. 50°5–51°7. |
| [28] " " " | " | .9931, 65°5. | | |
| [29] " " " | " | .9746, 68°2. | | |
| [30] " Liquid. | " | .9245, 65°5. | | |
| [31] Diarachin. | $C_{43} H_{84} O_5$. | | | 75.° |
| [32] Monolein. | $C_{21} H_{40} O_4$. | .947. | | |
| [33] Diolein. | $C_{39} H_{72} O_5$. | .921, 21.° | | s. 15.° |

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## 16th. SACCHARINE, STARCHY, AND GUMMY BODIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Cane sugar. | $C_{12} H_{22} O_{11}$. | 1.600. | | |
| [2] " " | " | 1.606. | | 160.° |
| [3] " " | " | 1.593. | | |
| [4] " " | " | 1.596. | | |
| [5] " " | " | 1.5578. | | |
| [6] Milk " | " | 1.534. | | |
| [7] " " | " | 1.53398, 4.° | | |
| [8] Melezitose. | " | | | Below 140.° |
| [9] Mycose. | $C_{12} H_{22} O_{11}$.2aq. | | | 100.° |
| [10] Glucose. Anhydrous. | $C_6 H_{12} O_6$. | | | 146.° |
| [11] " Cryst. | $C_6 H_{12} O_6 . H_2 O$. | 1.3861.) | | |
| [12] " " | " | 1.391. ) | | |
| [13] " " | " | 1.54–1.57, 11.° | | |
| [14] Sorbite. | $C_6 H_{12} O_6$. | 1.654, 15.° | | |
| [15] Inosite. | $C_6 H_{12} O_6$. 2aq. | | | 210°+. |
| [16] " Crystals. | " | 1.1154, 5.° | | |
| [17] Pinite. | $C_6 H_{12} O_5$. | 1.520. | | |
| [18] Quercite. | " | | | 235.° |
| [19] Mannite. | $C_6 H_{14} O_6$. | | a. 200.° | 160°–165.° |
| [20] Dulcite. | " | | | a. 190.° |
| [21] " | " | | | 182.° s. 181.° |
| [22] " | " | | | 182.° |
| [23] " | " | 1.466, 15.° | | 186.° |
| [24] " | " | | | 187.° |
| [25] Erythromannite. | $C_4 H_{10} O_4$. | 1.590. | | 112.° |
| [26] " | " | | | 120.° |
| [27] Starch. | $C_6 H_{10} O_5$. | 1.505. | | |
| [28] " | " | 1.530. | | |
| [29] " | " | 1.56. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Starch. Arrowroot. | $C_6 H_{10} O_5$. | 1.5045, air dried. | | |
| [2] " Potato. | " | 1.5029, " " | | |
| [3] " " | " | 1.6330, dried at 100.° | | |
| [4] Cellulose. | " | 1.525. | | |
| [5] Gum. | $C_{12} H_{22} O_{11}$. | 1.487, air dried. | | |
| [6] " | " | 1.525, dried at 100.° | | |
| [7] " Gum arabic. | " | 1.355. | | |
| [8] " " tragacanth. | " | 1.384. | | |
| [9] " " Senegal. | " | 1.436. | | |
| [10] " Bassora gum. | " | 1.359. | | |

## 17th. MISCELLANEOUS ACIDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [11] Crotonic acid. | $C_4 H_6 O_2$. | | | 72.° s. 70°5. |
| [12] Angelic " | $C_5 H_8 O_2$. | | 190.° | 45.° |
| [13] Pyroterebic acid. | $C_6 H_{10} O_2$. | 1.01. | 200°+. | |
| [14] " " | " | | 210.° | |
| [15] Moringic " | $C_{15} H_{28} O_2$. | .908, 12°5. | | |
| [16] Hypogæic " | $C_{16} H_{30} O_2$. | | | 34°–35.° |
| [17] Oleic " | $C_{18} H_{34} O_2$. | .808, 19.° | | |
| [18] " " | " | | | 14.° s. 4.° |
| [19] Brassic " | $C_{22} H_{42} O_2$. | | | 32°–33.° |
| [20] " "Erucic. | " | | | 34.° s. 33.° |
| [21] Isopropacetic acid. | $C_5 H_{12} O_2$. | .95357, 0.° | 175.° | |
| [22] Methyl diacetic " | $C_5 H_8 O_3$. | 1.037, 9.° | 169°–170.° | |
| [23] Ethyl " " | $C_6 H_{10} O_3$. | 1.03, 5.° | 180°8. | |
| [24] Methyl glycollic " | $C_3 H_6 O_3$. | 1.180. | 198.° | |
| [25] Amyl " " | $C_7 H_{14} O_3$. | 1.003. | 235.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Quartenylic acid. | $C_4 H_6 O_2$. | 1.018,25.° | 171°9. | |
| [2] Homolactic " | $C_2 H_4 O_3$. | 1.197, 13.° | | |
| [3] Linoleic " | $C_{16} H_{28} O_2$. | .9206, 14.° | | |
| [4] Ricinoleic " | $C_{18} H_{34} O_3$. | .940, 15.° | | s.–6°to–10.° |
| [5] Sorbic " | $C_6 H_8 O_2$. | | | 134°5. |
| [6] Parasorbic " | " | 1.068, 15.° | 221.° | |
| [7] Hydrosorbic " | $C_6 H_{10} O_2$. | .969, 19.° | 204°5. | |
| [8] Pyroracemic " | $C_3 H_4 O_3$. | 1.288, 18.° l. | 165.° | |
| [9] Citric " | $C_6 H_8 O_7$. | 1.617. | | |
| [10] " " | " | 1.542. | | |
| [11] " " | " | 1.553. | | |
| [12] Tartaric " | $C_4 H_6 O_6$. | 1.75. | | |
| [13] " " | " | 1.764. | | |
| [14] " " | " | 1.739. | | |
| [15] Racemic acid. Dextro. | $C_4H_6O_6.H_2O$ | 1.75. | | |
| [16] " " Laevo. | " | 1.7496. | | |
| [17] " " | " | 1.69. | | |
| [18] Methyl salicylic acid. | $C_8 H_8 O_3$. | 1.18, 10.° | 222.° | |
| [19] Ethyl " " | $C_9 H_{10} O_3$. | | 225.° | |
| [20] " " " | " | 1.097. | 229°5. | |
| [21] " " " | " | 1.1843, 10.° | 221.° | |
| [22] Amyl " " | $C_{12} H_{16} O_3$. | | 270.° | |
| [23] Cinnamic " | $C_9 H_8 O_2$. | 1.245. | 300°–304.° | 129.° |
| [24] " " | " | 1.195. | | |
| [25] Benzoic " | $C_7 H_6 O_2$. | 1.29. Cryst. | | |
| [26] " " | " | 1.201, 21.° Solid. | | |
| [27] " " | " | 1.206, 25°8. } Liquid. | | |
| [28] " " | " | 1.227, 27.° } | | |
| [29] " " | " | 1.0838, 121°4. | 249°2. | 121°4. |
| [30] Alpha toluic " | $C_8 H_8 O_2$. | 1.3. Solid. | | |
| [31] " " " | " | 1.0778, 83.° } | | |
| [32] " " " | " | 1.0334, 135.° } | 265°5. | 76°5. |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Pimaric acid. | $C_{20}H_{30}O_2$. | 1.047, 18.° | | 155.° |
| [2] Sylvic " | " | 1.1011, 18.° | | 162.° |
| [3] Eugenic " | $C_{10}H_{12}O_2$. | 1.076. | 242.° | |
| [4] " " | " | 1.0684, 14.° | 251.° | |
| [5] Quinic " | $C_7H_{12}O_6$. | 1.637, 8°5. | | |
| [6] " " | " | | | 161°6. |
| [7] " " | " | | | 161°–162° |
| [8] Ethyl camphoric acid. | $C_{12}H_{20}O_4$. | 1.095, 20°5. | 196.° | |
| [9] Diethyl camphresic acid | $C_9H_{22}O_7$. | 1.128, 13.° | | |
| [10] Phycic acid. | | .896. Solid. | 150.° d. | 136.° |
| For salicylous acid, see "Salicylol." | | | | |
| For carbolic acid, see "Phenol." | | | | |

## 18th. MISCELLANEOUS ETHERS OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [11] Ethacetic ether. | $C_6H_{12}O_2$. | .8942, 0.° | 119.° | |
| [12] Diethacetic " | $C_8H_{16}O_2$. | .8822, 0.° | 151.° | |
| [13] Ethyl isopropacetate. | $C_7H_{14}O_2$. | .8882, 0.° | 134°–135.° | |
| [14] " " | " | .87166, 18.° | 758.4 m. m. | |
| [15] Methyl methyldiacetate | $C_6H_{10}O_3$. | 1.020, 9.° | 177°4. | |
| [16] Ethyl " | $C_7H_{12}O_3$. | .995, 14.° | 189°7. | |
| [17] Methyl ethyldiacetate. | " | 1.009, 6.° | 186°8. | |
| [18] Ethyl " | $C_8H_{14}O_3$. | .998, 12.° | 198.° | |
| [19] " ethylglycollate. | $C_6H_{12}O_3$. | .978. | | |
| [20] " dimethoxalate. | " | .9931, 13.° | | |
| [21] " ethomethoxalate. | $C_7H_{14}O_3$. | .9768, 13.° | 165°5. | |
| [22] Methyl diethoxalate. | " | .9896, 16°5. | 165.° | |
| [23] Ethyl " | $C_8H_{16}O_3$. | .9613, 18°7. | 175.° | |
| [24] " amylhydroxalate. | $C_9H_{18}O_3$. | .9449, 13.° | 203.° | |
| [25] " ethylamylhydroxalate. | $C_{11}H_{22}O_3$. | .9399, 13.° | 224°–225.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Amyl diethoxalate. | $C_{11}H_{22}O_3$. | .93227, 13.° | 225.° | |
| [2] Ethyl diamyloxalate. | $C_{14}H_{28}O_3$. | .9137, 13.° | 262.° | |
| [3] " ethylcrotonate. | $C_8H_{14}O_2$. | .9203, 13.° | 165.° | |
| [4] " tiglate. | $C_7H_{12}O_2$. | .926, 21.° | 156.° | |
| [5] " quartenylate. | $C_6H_{10}O_2$. | .927, 19.° | 136.° | |
| [6] Acetoglycollic ether. | $C_6H_{10}O_4$. | 1.0093, 17.° | 179.° | |
| [7] Acetyl lactic " | $C_7H_{12}O_4$. | 1.0458, 17.° | 177.° | |
| [8] Lactobutyric " | $C_9H_{16}O_4$. | 1.024, 0.° | 200°–210.° | |
| [9] " " | " | 1.028, 0.° | 208.° | |
| [10] Lactosuccinic ether. | $C_{11}H_{18}O_6$. | 1.119, 0.° | 280.° | |
| [11] Ethyl dilactate. | $C_8H_{14}O_5$. | 1.134, 0.° | 235.° | |
| [12] Diethyl trilactate. | $C_{13}H_{22}O_7$. | | a. 270.° | |
| [13] Diethyl glycollic ether. | $C_{20}H_{36}O_{10}$. | 1.01, 19.° | 251°–255.° | |
| [14] Diethyl glyoxylic " | $C_8H_{16}O_4$. | .994, 18.° | 199°2. | |
| [15] Benzoyl glycollic " | $C_{11}H_{12}O_4$. | 1.1509, 20°4. | 286°4–288°4 | |
| [16] Methyl oleate. | $C_{19}H_{36}O_2$. | .879, 18.° | | |
| [17] Ethyl " | $C_{20}H_{38}O_2$. | .871, 18.° | | |
| [18] Methyl elaidate. | $C_{19}H_{36}O_2$. | .872, 18.° | | |
| [19] Ethyl " | $C_{20}H_{38}O_2$. | .869, 18.° | 370.° | |
| [20] " citrate. | $C_{12}H_{20}O_7$. | 1.142, 21.° | 283.° | |
| [21] " citraconate. | $C_9H_{14}O_4$. | 1.040, 18°5. | 225.° | |
| [22] " mesaconate. | " | 1.043, 20.° | 220.° | |
| [23] " aconitate. | $C_{12}H_{18}O_6$. | 1.074, 14.° | 230.° | |
| [24] " fumarate. | $C_8H_{12}O_4$. | 1.106, 11.° | 225.° | |
| [25] " veratrate. | $C_{11}H_{14}O_4$. | 1.141, 18.° s. | | 42.° |
| [26] " pyromucate. | $C_7H_8O_2$. | 1.297, 20.° | 208°–210.° | 34.° |
| [27] Methyl mucate. | $C_8H_{16}O_8$. | 1.48–1.50, 20.° | | |
| [28] Ethyl " | $C_{10}H_{18}O_8$. | 1.17,–1.32, 20.° | | 150°s135° |
| [29] " camphorate. | $C_{14}H_{24}O_4$. | 1.029, 16.° | 285°–287.° | |
| [30] " paracamphorate. | " | 1.03, 15.° | 270°–275.° | |
| [31] " camphresate. | $C_{16}H_{26}O_7$. | 1.0775, 13.° | | |
| [32] Methyl cinnamate. | $C_{10}H_{10}O_2$. | 1.106. | 241.° | |
| [33] Ethyl " | $C_{11}H_{12}O_2$. | 1.126, 0.° | 262.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Ethyl cinnamate. | $C_{11} H_{12} O_2$. | | 205.° | |
| [2] | " " | " | 1.13. | 260.° | |
| [3] | " " | " | | 262.° | |
| [4] | " " | " | 1.0656, 0.° | 266.° | |
| [5] | " " | " | 1.0498, 20°2. | 760 m. m. | |
| [6] | Methyl benzoate. | $C_8 H_8 O_2$. | 1.10, 17.° | 198°5. | |
| [7] | " " | " | 1.1026, 0.° | 199°2. | |
| [8] | " " | " | 1.0876, 16°3. | | |
| [9] | " " | " | 1.0921, 12°3. | | |
| [10] | Ethyl " | $C_9 H_{10} O_2$. | 1.0539, 10°5. | 209.° | |
| [11] | " " | " | 1.06, 18.° | 208°–209.° | |
| [12] | " " | " | 1.049, 14.° | 207.° | |
| [13] | " " | " | 1.0657, 0.° | 212°9. | |
| [14] | " " | " | 1.0556, 10°5. | | |
| [15] | " " | " | 1.0517, 14°1. | | |
| [16] | Amyl " | $C_{12} H_{16} O_2$. | 1.0039, 0.° | 260°7. | |
| [17] | " " | " | .9925, 14°4. | | |
| [18] | " " | " | | 252°–254.° | |
| [19] | Isopropyl " | $C_{10} H_{12} O_2$. | 1.054, 0.° | 218.° | |
| [20] | " " | " | 1.013, 25.° | 762 m. m. | |
| [21] | Ethyl toluate. | " | | 228.° | |
| [22] | " xylylate. | $C_{11} H_{14} O_2$. | | 233.° | |
| [23] | " cuminate. | $C_{12} H_{16} O_2$. | | 240.° | |
| [24] | Methyl homotolhate. | $C_{10} H_{12} O_2$. | 1.0455, 0.° | 238°–239.° | |
| [25] | " " | " | 1.018, 49.° | | |
| [26] | Ethyl " | $C_{11} H_{14} O_2$. | 1.0343, 0.° | 247°–249.° | |
| [27] | " " | " | .9925, 49.° | | |
| [28] | Amyl " | $C_{14} H_{20} O_2$. | 9807, 0.° | 291°–293.° | |
| [29] | " " | " | .9520, 49.° | | |
| [30] | Diethyl oxybenzoate. | $C_{11} H_{14} O_3$. | 1.0875, 0.° | 263.° | |
| [31] | " " | " | 1.0725, 20.° | | |
| [32] | Methyl phenylacetate. | $C_9 H_{10} O_2$. (?) | 1.044, 16.° | 220.° | |
| [33] | Ethyl " | $C_{10} H_{12} O_2$. (?) | 1.031. | 226.° | |

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## 19th. MISCELLANEOUS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Dimethylene carbon-ethylene ether. | $C_8 H_{14} O_3$. | .998, 12.° | 198.° | |
| [2] Aldehyde diacetate. | | 1.07, 10.° | | |
| [3] Acrolein acetate. | $C_7 H_{10} O_4$. | 1.076, 22.° | 180.° | |
| [4] Methylal. | $C_3 H_8 O_2$. | .8551. | 42.° | |
| [5] Dimethyl acetal. | $C_4 H_{10} O_2$. | .8555, 0.° | 65.° | |
| [6] " " | " | .8674, 1.° | 64 4. | |
| [7] " " | " | .8787, 0.° | | |
| [8] " " | " | .8590, 14.° | | |
| [9] " " | " | .8503, 22.° | 63°–64.° | |
| [10] " " | " | .8497, 23.° | | |
| [11] " " | " | .8476, 25.° | | |
| [12] Methyl " | $C_5 H_{12} O_2$. | .8535, 0.° | 85.° | |
| [13] Acetal. | $C_6 H_{14} O_2$. | .842, 21.° | 75.° | |
| [14] " | " | .823, 20.° | 95°2. | |
| [15] " | " | .821, 22°4. | 104°–106.° | |
| [16] " | " | | 104.° | |
| [17] Dimethyl valeral. | $C_7 H_{16} O_2$. | .852, 10.° | 124.° | |
| [18] Diethyl " | $C_9 H_{20} O_2$. | .835, 12.° | 158°2. | |
| [19] Diamyl acetal. | $C_{12} H_{26} O_2$. | .8347, 15.° | 210°8. | |
| [20] " valeral. | $C_{15} H_{32} O_2$. | .849, 7.° | 240°–255.° | |
| [21] Valeral diacetate. | $C_9 H_{16} O_4$. | .963. | 195.° | |
| [22] Derivative of valeral. | $C_{10} H_{18} O$. | .9027, 17.° | 250°–290.° | |
| [23] Ethyl diacetone carbonate. | $C_{10} H_{18} O_3$. | .9738, 20.° | 210°–212.° | |
| [24] " ethacetone " | $C_8 H_{14} O_3$. | .9834, 16.° | 195.° | |
| [25] " dimethacetone " | " | .9913, 16.° | 184.° | |
| [26] " isopropacetone " | $C_9 H_{16} O_3$. | .98046, 0.° | 201.° | |
| [27] Acetyl valeryl. | $C_7 H_{12} O_2$. | .8804, 15°5. | | |
| [28] Metacrolein. | $C_6 H_8 O_2$. | 1.03, 8.° | | |
| [29] Mesityl oxide. | $C_6 H_{10} O$. | .848, 23.° | 131.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Acrolein. | $C_3 H_4 O$. | | 52°4. | |
| [2] Pinacone. l. | $C_6 H_{14} O_2$. | .96, 15.° | 176°–177.° | |
| [3] Isobenzpinacone. l. | $C_{26} H_{22} O_2$. | 1.10, 19.° | 297°5. | |
| [4] Acropinacone. | $C_6 H_{10} O_2$. | .99, 17.° | 160°–180.° | |
| [5] Pinacolin. | $C_6 H_{12} O$. (?) | .7999, 16.° | 105.° | |
| [6] Phorone. | $C_9 H_{14} O$. (?) | .939, 12.° | | |
| [7] « | « | .932, 12.° | | |
| [8] « Camphorone. | « | .9614, 20.° | | |
| [9] « | « | | 196.° | 20.° |
| [10] Diacetyl conylene. | $C_{12} H_{20} O_4$. | .988, 18.2. | 225.° | |
| [11] Derivative of chloroform. | $C_7 H_{16} O_3$. | .8964, | 145°–146.° | |
| [12] Triethyl propylphycite. | $C_9 H_{20} O_4$. | .976, 0.° | | |
| [13] « « « | « | .96051, 16°5. | | |
| [14] Diethoxyl ether. | $C_8 H_{18} O_3$. | .8924, 21.° | 168.° | |
| [15] Citraconic anhydride. | $C_5 H_4 O_3$. | 1.247. | | |
| [16] Camphoric « s. | $C_{10} H_{14} O_3$. | 1.194, 20°5. | 270.° | 217.° |
| [17] Camphor. | $C_{10} H_{16} O$. | .986,–.996. | | |
| [18] Patchouli camphor. | $C_{30} H_{28} O_2$. | 1.051, 4°5. | 296.° | 54°–55.° |
| [19] Ethylated camphor. | $C_{12} H_{20} O$. | .946, 22.° | 226°–231.° | |
| [20] Amylated « | $C_{15} H_{26} O$. | .919, 15.° | 272°–275.° | |
| [21] Acetyl « | $C_{12} H_{18} O_2$. | .986, 20.° | 227°–230.° | |
| [22] Ethylated borneol. | $C_{12} H_{22} O$. | .916, 23.° | 202°5. | |
| [23] Methylated « | $C_{11} H_{20} O$. | .933, 15.° | 194°5. | |
| [24] Camphrene. | $C_8 H_{12} O$. | .974, 6.° | a. 240.° | |
| [25] Acetyl camphrene. | $C_{20} H_{30} O_2$. | .954, 18.° | 230°–240.° | |
| [26] Styryl alcohol. | $C_9 H_{10} O$. | | 254.° | 8.° |
| [27] Anisaldehyde. | $C_8 H_8 O_2$. | 1.09, 20.° | 253°–255.° | |
| [28] « | « | 1.1228, 18.° | 247°–248.° | |
| [29] Salicylol, salicylous acid, | $C_7 H_6 O_2$. | 1.1731, 13°3. | 196°5. | |
| [30] or salicyl hydride. | « | | 182°–185.° | |
| [31] « « | « | | 178°2. | |
| [32] Salicin. Natural. | $C_{13} H_{18} O_7$. | 1.4338, 26.° | | |
| [33] « Artificial. | « | 1.4257. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Saliretin. | $C_7 H_6 O$. | 1.1161, 25.° | | |
| [2] Saligenin. | $C_7 H_8 O_2$. | 1.1613, 25.° | | |
| [3] Benzoyl hydride. | $C_7 H_6 O$. | 1.075. | | |
| [4] " " | " | 1.038, 15.° | 180°–183.° | |
| [5] " " | " | 1.043. | | |
| [6] " " | " | 1.0636, 0.° | 179.° | |
| [7] " " | " | 1.0499, 14°6. | | |
| [8] " " | " | 1.0504. | | |
| [9] Methyl benzoyl. | $C_8 H_8 O$. | 1.032, 15.° | 198.° | |
| [10] Benzoycin. | $C_{10} H_{12} O_4$. | 1.228. | | |
| [11] Isomer of benzil. | $C_{14} H_{10} O_2$. | 1.104, 10.° | 314.° | |
| [12] Ethyl benzhydrol ether. | $C_{15} H_{16} O$. | 1.029, 20.° | 183.° | |
| [13] Acetic " " | $C_{15} H_{14} O_2$. | 1.49, 22.° | 301°–302.° | |
| [14] Benzyl benzoate. | $C_{14} H_{12} O_2$. | | 345.° | |
| [15] " " | " | 1.114, 18°5. | 303°–304.° | |
| [16] " cinnamate. | $C_{15} H_{15} O_2$. | | 305.° | |
| [17] " " [dride. | " | 1.098, 14.° | | |
| [18] Benzo œnanthylic anhy- | $C_{14} H_{18} O_3$. | 1.043. | | |
| [19] Benzo cinnamic " | $C_{16} H_{12} O_3$. | 1.184, 23.° | | |
| [20] Benzo cuminic " | $C_{17} H_{16} O_3$. | 1.115, 23.° | | |
| [21] Cuminol. | $C_{10} H_{12} O$. | | 220.° | |
| [22] " | " | .9832, 0.° | 236.° | |
| [23] " | " | .9727, 13°4. | | |
| [24] " | " | .9751, 15.° | | |
| [25] Veratrol. l. | $C_8 H_{10} O_2$. | 1.086, 15.° | 202°–205.° | 15.° |
| [26] Phenyl acetate. | $C_8 H_8 O_2$. | | 188.° | |
| [27] " " | " | 1.074. | 200.° | |
| [28] Benzyl " | $C_9 H_{10} O_2$. | | 210.° | |
| [29] Ethyl phenyl carbonate. | $C_9 H_{10} O_3$. | 1.117, 0.° | 234.° | |
| [30] Phenol. | $C_6 H_6 O$. | 1.062, 20.° | 197°5. | |
| [31] " | " | 1.065, 18.° | 187°–188.° | 34°–35.° |
| [32] " | " | 1.0627. | 184.° | |
| [33] " | " | 1.0808, 0.° | 187°6–188°1. | |
| [34] " | " | 1.0597, 32°9. | | |

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[34] }

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Phenol. | $C_6 H_6 O.$ | 1.0554. | 187.° | s.—18.° |
| [2] " | " | 1.068. | 186°–187.° | |
| [3] " | " | 1.0667, 38.° | 183.° | 37°5. |
| [4] Kresol. | $C_7 H_8 O.$ | 1.033, 23.° | 198.° | |
| [5] " | " | | 198.° | 35.° |
| [6] Metakresol. | " | | 189°–190.° | s.—38.° |
| [7] Parakresol. | " | | 197.° | 36.° s. 34.° |
| [8] " | " | | 201°5–202.° | 34°5. |
| [9] Benzyl alcohol. | $C_7 H_8 O.$ | 1.059. | 204.° | |
| [10] " " | " | 1.0628, 0.° | 206°5. | |
| [11] " " | " | 1.0507, 15°4. | 75¹.4 m. m. | |
| [12] " " | " | 1.0465, 19.° | 206°2. | |
| [13] Anisol. | $C_7 H_8 O.$ | .991, 15.° | 152.° | |
| [14] Phenetol. | $C_8 H_{10} O.$ | | 175.° | |
| [15] " | " | Less than water. | 172.° | |
| [16] Ethyl phenol. | $C_8 H_{10} O.$ | | 211.° | 47°–48.° |
| [17] Xylenol. Phloretol. | $C_8 H_{10} O.$ | 1.0374, 12.° | a. 220.° | |
| [18] " Alpha. | " | .9709, 81.° | 213°5. | 75.° |
| [19] " Beta. | " | 1.036, 0.° | 211°5. | |
| [20] " " | " | .9700, 81.° | | |
| [21] " Xenol. | " | 1.0233, 22.° | 214°2. | |
| [22] Ethyl kresol. | $C_9 H_{12} O.$ | .8744, 0.° | 188.° | |
| [23] Isopropyl phenate. | $C_9 H_{12} O.$ | .958, 0.° | 176.° | |
| [24] " " | " | .947, 12°5. | | |
| [25] Styrolyl ethyl ether. | $C_{10} H_{14} O.$ | .931, 21°9. | 185°–187.° | |
| [26] Thymol, of Ajowan oil. | $C_{10} H_{14} O.$ | 1.0285. s. | distils 222.° | 44.° |
| [27] " Cymyl alcohol. | " | | 243.° | |
| [28] Isobutyl anisol. | $C_{10} H_{14} O.$ | .9388, 16.° | 198.° | |
| [29] Phenamylol. | $C_{11} H_{16} O.$ | | 224°–225.° | |
| [30] Methyl thymol. | $C_{11} H_{16} O.$ | .941, 18.° | 205.° | |
| [31] Carvol. | $C_{10} H_{14} O.$ | .953, 15.° | 225°–230.° | |
| [32] Geraniol. | $C_{10} H_{18} O.$ | 8851, 15.° | 232°–233.° | |
| [33] " | " | 8813, 21.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Cajeputene hydrate. | $C_{10}$ $H_{18}$ O. | .903, 17.° | 175.° | |
| [2] Cinacrol. | $C_{10}$ $H_{18}$ $O_2$. | 1.05–1.15. | a. 250.° | |
| [3] Colophonone. | $C_{11}$ $H_{18}$ O. | .84. | 97.° | |
| [4] Ericinol. | $C_{10}$ $H_{16}$ O. | .874, 20.° | 240°–242.° | |
| [5] Oil Mentha Pulegium. | $C_{10}$ $H_{16}$ O. | .9271,—.939. | 182°–185.° | |
| [6] Geraniol ether. | $C_{20}$ $H_{34}$ O. | | 187°–190.° | |
| [7] Cardol. | $C_{21}$ $H_{31}$ $O_2$. | .978, 23.° | | |
| [8] Ivaol. | $C_{26}$ $H_{40}$ O. | .9346, 15.° | | |
| [9] Terpinol. | $C_{20}$ $H_{34}$ $O_2$. | .852. | 168.° | |
| [10] Eucalyptol. | $C_{12}$ $H_{20}$ O. | .905, 8.° | 175.° | |
| [11] Safrol. | $C_{10}$ $H_{10}$ $O_2$. | 1.1141, 0.° | 231°–233.° | |
| [12] Kreosol. | $C_8$ $H_{10}$ $O_2$. | 1.0894, 13.° | 219.° | |
| [13] Cholesterine. | $C_{26}$ $H_{44}$ O. | 1.03, Melted. | | 169°–170.° |
| [14] Santonin. | $C_{15}$ $H_{18}$ $O_3$. | 1.247, 20°5. | | 135°–136.° |
| [15] Cochlearin. | $C_6$ $H_{14}$ $O_2$.(?) | 1.248. | | 45.° |
| [16] Picrolichenin. | | 1.176. | | |
| [17] Calophyllum Resin. | $C_{14}$ $H_{18}$ $O_4$. | 1.12, Cryst. | | 105.° s. 90.° |
| [18] Antiar Resin. | $C_{16}$ $H_{24}$ O. | 1.032. | | |
| [19] Guyaquillite. | $C_{20}$ $H_{26}$ $O_3$. | 1.092. | | |
| [20] Hartin. | $C_{20}$ $H_{34}$ $O_2$. | 1.115, 19.° | | 210.° |
| [21] From wormseed oil. | $C_{12}$ $H_{20}$ O. | .919, 20.° | 174°–175.° | |
| [22] " Angostura bark. | $C_{13}$ $H_{24}$ O. | .934. | a. 266.° | |
| [23] Oil of wormwood. | $C_{10}$ $H_{16}$ O. | .973, 24.° | 200°–205.° | |
| [24] From oil of Osmitopsis asteriscoides. | $C_{10}$ $H_{18}$ O. | .921. | 178°–188.° | |
| [25] Oil of Coriander. | $C_{10}$ $H_{18}$ O. | .871, 14.° | 150.° | |
| [26] " " Ginger. | $C_{80}$ $H_{138}$ $O_5$. | .893. | 246.° | |
| [27] " " Pulegium micranthum. | $C_{10}$ $H_{16}$ O. | .932, 17.° | 227.° | |
| [28] Alöisol. | $C_6$ $H_{16}$ $O_3$.(?) | .877, 15.° | 130.° | |
| [29] Xanthil. | $C_4$ $H_{20}$ $O_3$.(?) | .894. | 130.° | |
| [30] Furfurol. | $C_5$ $H_4$ $O_2$. | | 162.° | |
| [31] " | " | 1.1648, 15°6. | 162°8–163°3 | |
| [32] " | " | 1.1636, 13°5. | 166.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Furfurol. | $C_5 H_4 O_2$. | 1.168, 15°5. | 161°6. | |
| [2] " | " | 1.134, 15.° | 160°–180.° | |
| [3] " | " | 1.150, 15.° | | |
| [4] Fucusol. | $C_5 H_{10} O_2$. | 1.150, 13°5. | 171°–172.° | |
| [5] Guajol. | $C_9 H_{14} O_2$. | .871, 15.° | 115°–120.° | |
| [6] Guajacol. | | 1.1171, 13.° | 210.° | |
| [7] " | | 1.119, 22.° | 210.° | |
| [8] " | | 1.125, 16.° | 203°–205.° | |
| [9] " | | 1.119, 17°5. | | |
| [10] Kapnomor. | | .9775, 20.° | 185.° | |
| [11] " | | .995, 15°5. | | |
| [12] Kreosote. | | 1.037, 20.° | 203.° | |
| [13] " | | 1.076, 15°5. | | |
| [14] " | | 1.04, 11°5. | | |
| [15] " | | 1.057, 13.° | 202°–210.° | |
| [16] " | | 1.0831, 17°5. | | |
| [17] " | | 1.0874, 20.° | 195.° | |
| [18] " | | 1.087, 16.° | | |
| [19] Mesitene. | $C_6 H_{24} O_3$.(?) | .808. | 63.° | |
| [20] Xylite. | | .816. | 61°5. | |
| [21] " | | .805. | 61°–62.° | |

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# XLI. Compounds Containing C, H, and N.

## 1st. CYANIDES OF THE ETHYL SERIES.*

Nitriles.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Methyl cyanide. | $C H_3$. Cy. | | 77.° | |
| [2] " " | " | .8347, 0.° | 70°9–72°1. | |
| [3] " " | " | .8191, 16.° | | |
| [4] " " | " | | 77°–78.° | |
| [5] " " | " | | 77°6. | |
| [6] " " | " | | 77°–78.° | |
| [7] " " | " | | 81°–82.° | |
| [8] Ethyl " | $C_2 H_5$. Cy. | .787, 15.° | 82.° | |
| [9] " " | " | .7889, 12°6. | 88.° | |
| [10] " " | " | | 97°–98.° | |
| [11] " " | " | | 96°7. | |
| [12] " " | " | | 98.° | |
| [13] Propyl " | $C_3 H_7$. Cy. | .795, 12°5. | 118°5. | |
| [14] " " iso. | " | | a. 80.° | |
| [15] Butyl " | $C_4 H_9$. Cy. | .810. | 125.° | |
| [16] " " | " | .813, 15.° | 125°–128.° | |
| [17] " " | " | .8164, 0.° | 140°4. | |
| [18] Amyl " | $C_5 H_{11}$. Cy. | .8061, 20.° | 146.° | |
| [19] Heptyl " | $C_7 H_{15}$. Cy. | .8201, 13°3. | 194°–195.° | |
| [20] Octyl " | $C_8 H_{17}$. Cy. | .8187, 14.° | 200.° | |

## 2d. AMINES OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [21] Dimethylamine. | $C_2 H_7 N$. | | –10°, to–15.° | |
| [22] " " | " | | 8°–9.° | |
| [23] Ethylamine. | $C_2 H_7 N$. | .6964, 8.° | 18°7. | |

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*Compare these cyanides with the carbylamines.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Trimethylamine. | $C_3 H_9 N.$ | | 9.° | |
| [2] Propylamine. | " | | 49°7. | |
| [3] " | " | .7283, 0.° | 49°–50.° | |
| [4] " | " | .7134, 21.° | 761 m. m. | |
| [5] " iso. | " | .690, 18.° | 31°5. | |
| [6] " iso. | " | | 31°–32°5. | |
| [7] Diethylamine. | $C_4 H_{11} N.$ | | 57.° | |
| [8] Butylamine. | $C_4 H_{11} N.$ | | 69°–70.° | |
| [9] " | " | .7553, 0.° | 75°5. | |
| [10] " | " | .7333, 26.° | 740 m. m. | |
| [11] Amylamine. | $C_5 H_{13} N.$ | | 93.° | |
| [12] " | " | .7503, 18.° | 95.° | |
| [13] " | " | .815, 0.° | 95.° | |
| [14] " iso. | " | .755, 0.° | 78°5. | |
| [15] Di-isopropylamine. | $C_6 H_{15} N.$ | .722, 22.° | 83°5–84.° | |
| [16] Hexylamine. | $C_6 H_{15} N.$ | .768, 17.° | 125°–128.° | |
| [17] Heptylamine. | $C_7 H_{17} N.$ | | 144°–148.° | |
| [18] " | " | | 145°–147.° | |
| [19] Methylethylamylamine. | $C_8 H_{19} N.$ | | 135.° | |
| [20] Octylamine. | $C_8 H_{19} N.$ | .786. | 164.° | |
| [21] " | " | | 172°–175.° | |
| [22] " | " | | 175.° | |
| [23] " | " | | 168°–172.° | |
| [24] Diethylamylamine. | $C_9 H_{21} N.$ | | 154.° | |
| [25] Nonylamine. | $C_9 H_{21} N.$ | | 190°–192.° | |
| [26] Diamylamine. | $C_{10} H_{23} N.$ | | 170.° | |
| [27] " | " | .7825, 0.° | 178°–180.° | |
| [28] Triamylamine. | $C_{15} H_{33} N.$ | | 257.° | |
| [29] Tricetylamine. | $C_{48} H_{99} N.$ | | | 39.° s. 33.° |

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## 3d. BASES OF THE ANILINE SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Phenylamine. Aniline. | $C_6 H_7 N$. | 1. 020; 16.° | 182.° | |
| [2] « « | « | 1.028. | 228.° | |
| [3] « « | « | 1.0361, 0.° | 184°8. | |
| [4] « « | « | 1.0251, 13°7. | | |
| [5] « « | « | 1.018, 15°5. | 184°5. | |
| [6] Toluidine. Benzylamine. | $C_7 H_9 N$. | | 198.° | |
| [7] « | « | .990, 14.° | 183.° | |
| [8] « | « | | 205°–206.° | 45.° |
| [9] « Pseudo. | « | 1.0002, 16°3. | 198.° | |
| [10] « | « | 1.003, 20°2. | 199.° | |
| [11] « Different | « | .998, 25°5. | 199.° | |
| [12] « preparations. | « | | 200.° | 45.° |
| [13] « | « | 1.002, 22.° | 199.° | |
| [14] Methyl aniline. | $C_7 H_9 N$. | | 192.° | |
| [15] Xylidine. | $C_8 H_{11} N$. | .985, 18°5. | 216.° | |
| [16] « Alpha. | « | .975, 22.° | 213°–214.° | |
| [17] « Beta. | « | .983, 22.° | 210°–211.° | |
| [18] Ethyl aniline. | $C_8 H_{11} N$. | .954, 18.° | 204.° | |
| [19] Cumidine. | $C_9 H_{13} N$. | .8526. | 225.° | |
| [20] Ethyl toluidine. | $C_9 H_{13} N$. | .9391, 15°5. | 217.° | |
| [21] Cymidine. | $C_{10} H_{15} N$. | Less than water. | a. 250.° | |
| [22] Diethyl aniline. | $C_{10} H_{15} N$. | .939, 18.° | 213°5. | |
| [23] Amyl « | $C_{11} H_{17} N$. | | 258.° | |
| [24] Diethyl toluidine. | $C_{11} H_{17} N$. | .9242, 15°5. | 229.° | |
| [25] Ethyl amyl aniline. | $C_{13} H_{21} N$. | | 262.° | |
| [26] Diamyl « | $C_{16} H_{27} N$. | | 275°–280.° | |
| [27] Cetyl « | $C_{22} H_{39} N$. | | | 42.° s. 28. |
| [28] Dibenzylamine. | $C_{14} H_{15} N$. | 1.033, 14.° | | |
| [29] Allyl aniline. | $C_9 H_{11} N$. | .982, 25.° | 208°–209.° | |

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## 4th. BASES OF THE PYRIDINE SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Pyridine. | $C_5 H_5 N.$ | .9858, 0.° | 116°7. | |
| [2] " | " | .924, 22.° | 115.° | |
| [3] " | " | | 116°5. | |
| [4] Picoline. | $C_6 H_7 N.$ | .955, 10.° | 133.° | |
| [5] " | " | .9613, 0.° | 135.° | |
| [6] " | " | .933, 22.° | 134.° | |
| [7] " | " | | 135.° | |
| [8] " | " | | 135.° | |
| [9] Parapicoline. | " | 1.077. | 260°–315.° | |
| [10] Lutidine. | $C_7 H_9 N.$ | .928. | 177°–183.° | |
| [11] " | " | .9467, 0.° | 154°5. | |
| [12] " | " | .945, 22.° | 154.° | |
| [13] " Alpha. | " | .9467, 0.° | 154.° | |
| [14] " Beta. | " | .9555, 0.° | 163°–168.° | |
| [15] Collidine. | $C_8 H_{11} N.$ | .921. | 179.° | |
| [16] " | " | | 179.° | |
| [17] " | " | .9439, 0.° | 180.° | |
| [18] " | " | | 180.° | |
| [19] " | " | .953, 22.° | 170.° | |
| [20] " | " | | 178°–180.° | |
| [21] Parvoline. | $C_9 H_{13} N.$ | .966, 22.° | 188.° | |
| [22] Coridine. | $C_{10} H_{15} N.$ | .974, 22.° | 211.° | |
| [23] Rubidine. | $C_{11} H_{17} N.$ | 1.017, 22.° | 230.° | |
| [24] Viridine. | $C_{12} H_{19} N.$ | 1.024, 22.° | 251.° | |

## 5th. MISCELLANEOUS COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [25] Methyl carbylamine. | $C_2 H_3 N.$ | | 58°–59.° | |
| [26] Ethyl " | $C_3 H_5 N.$ | | 78°–80.° | |
| [27] Isopropyl " | $C_4 H_7 N.$ | .7596, 0.° | 87.° | |
| [28] Butyl " | $C_5 H_9 N.$ | .7873, 4.° | 114°–117.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Acetylamine. (?) | $C_2 H_5 N.$ | .975, 15.° | 218.° | |
| [2] | Allylamine. | $C_3 H_7 N.$ | .864, 15.° | 58.° | |
| [3] | Ethylene cyanide. | $C_4 H_4 N_2.$ | 1.023, 45.° | 37.° | |
| [4] | Allyl " | $C_4 H_5 N.$ | .8389, 12.° | 118°7–119°2. | |
| [5] | " " | " | .812, 0.° | 96°–106.° | |
| [6] | " " | " | .794, 17.° | | |
| [7] | " " | " | .8491, 0.° | 116°–118.° | |
| [8] | " " | " | .8351, 15.° | | |
| [9] | Phenyl " | $C_7 H_5 N.$ | 1.0073, 15.° | 190°–191.° | |
| [10] | " " | " | 1.0230, 0.° | 190°6. | |
| [11] | " " | " | 1.0084, 16°8. | | |
| [12] | Cumonitrile. | $C_{10} H_{11} N.$ | .765, 14.° | 239.° | |
| [13] | Chinoline. | $C_9 H_7 N.$ | 1.081, 10.° | 239.° | |
| [14] | " | " | | 238°–243.° | |
| [15] | Lepidine. | $C_{10} H_9 N.$ | 1.072, 15.° | 266°–271.° | |
| [16] | Pyrrol. | $C_4 H_5 N.$ | 1.077. | 133.° | |
| [17] | Coniine. | $C_8 H_{15} N.$ | .89. | 187°5. | |
| [18] | " | " | | 189.° | |
| [19] | " | " | | 212.° | |
| [20] | " | " | .878. | 168°–171.° | |
| [21] | " | " | | 163°5. | |
| [22] | Nicotine. | $C_5 H_7 N.$ | 1.033, 4.° | | |
| [23] | " | " | 1.027, 15.° | | |
| [24] | " | " | 1.018, 30.° | | |
| [25] | " | " | 1.0006, 50.° | | |
| [26] | " | " | .9424, 101°5. | | |

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## XLII. Compounds Containing C, H, N, and O.

### 1st. NITRITES AND NITRATES OF THE ETHYL SERIES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Methyl nitrite. | $C H_3 N O_2$. | .991. | —12.° | |
| [2] | Ethyl " | $C_2 H_5 N O_2$. | .886, 4.° | | |
| [3] | " " | " | .947, 15.° | 16°.4. | |
| [4] | " " | " | .898. | 17°.5–18.° | |
| [5] | " " | " | .900, 15°.5. | 16°.6–17°.8. | |
| [6] | Isopropyl " | $C_3 H_7 N O_2$. | .856, 0.° | 45.° | |
| [7] | " " | " | .844, 24.° | 762 m. m. | |
| [8] | Butyl " | $C_4 H_9 N O_2$. | .89445, 0.° | | |
| [9] | " " | " | .8771, 16.° | 67.° | |
| [10] | " " | " | .82568, 50.° | | |
| [11] | Amyl " | $C_5 H_{11} N O_2$. | | 96.° | |
| [12] | " " | " | .8773. | 91.° | |
| [13] | " " | " | | 99.° | |
| [14] | Methyl nitrate. | $C H_3 N O_3$. | 1.182, 20.° | 66.° | |
| [15] | Ethyl " | $C_2 H_5 N O_3$. | 1.112, 17.° | 85.° | |
| [16] | " " | " | 1.1322, 0.° | 86°.3. | |
| [17] | " " | " | 1.1123, 15°.5. | | |
| [18] | " " | " | 1.0948, 17.° | 87°.2. | |
| [19] | Isopropyl " | $C_3 H_7 N O_3$. | 1.054, 0.° | 101°–102.° | |
| [20] | " " | " | 1.036, 19.° | 760 m. m. | |
| [21] | Butyl " | $C_4 H_9 N O_3$. | | a. 130.° | |
| [22] | " " | " | 1.0384, 0.° | 123.° | |
| [23] | " " | " | 1.020, 16.° | | |
| [24] | Amyl " | $C_5 H_{11} N O_3$. | .902, 22.° | 137.° | |
| [25] | " " | " | .994, 10.° | 148.° | |
| [26] | " " | " | 1.000, 7°–8.° | 147°–148.° | |

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## 2d. NITRO-SUBSTITUTION COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Nitro caprylic acid. | $C_8 H_{15} N O_4$. | 1.093, 18.° | | |
| [2] Ethyl nitro caprylate. | $C_{10} H_{19} N O_4$. | 1.031, 18.° | | |
| [3] " nitro lactate. | $C_5 H_9 N O_5$. | 1.1534, 13.° | 178.° | |
| [4] " nitro malate. | $C_8 H_{13} N O_7$. | 1.2024, 16.° | | |
| [5] " nitro tartrate. | $C_8 H_{12} N_2 O_{10}$. | 1.2778, melted. | | 45°–46.° |
| [6] Nitro glycerine. | $C_3 H_5 N_3 O_9$. | 1.595,–1.60, 15.° | | |
| [7] " | " | 1.5958. | | |
| [8] " | " | 1.60. | | |
| [9] " | " | 1.60. | | |
| [10] Nitroso diethyline. | $C_4 H_{10} N_2 O$. | .951, 17°5. | 176°9. | |
| [11] Methyl nitrobenzoate. | $C_8 H_7 N O_4$. | | 279.° | 70.° |
| [12] Ethyl " | $C_9 H_9 N O_4$. | | 298.° | 42.° |
| [13] Nitrobenzol. | $C_6 H_5 N O_2$. | 1.209, 15.° | 213.° | s. 3.° |
| [14] " | " | 1.2002, 0.° | 219°–220.° | |
| [15] " | " | 1.1866, 14°4. | | |
| [16] Nitrotoluol. | $C_7 H_7 N O_2$. | 1.18, 16°5.° | 225.° | |
| [17] " Ortho. | " | 1.168, 22.° | 230°–231.° | |
| [18] " Meta. | " | 1.163, 23°5. | 222°–223.° | |
| [19] " " | " | 1.162, 23.° | | |
| [20] Nitroxylol. Beta. | $C_8 H_9 N O_2$. | 1.126, 17°5. | 237°–239.° | 2.° |
| [21] " " | " | 1.126, 24°5. | 227°–228.° | |
| [22] " Alpha. | " | 1.124, 25.° | 245°–246.° | |
| [23] Dinitro benzol. | $C_6 H_4 N_2 O_4$. | | | 87.° |
| [24] Dinitro aniline. | $C_6 H_5 N_3 O_4$. | | | 175.° |
| [25] Mono nitro methyl phenol. | $C_7 H_7 N O_3$. | 1.249, 26.° | 265.° | 9.°rs. 0.° |
| [26] Nitro isobutylanisol. Para. | $C_{10} H_{13} N O_3$. | 1.1361, 20.° | 275°–280.° | |
| [27] " " Ortho. | " | 1.1046, 20.° | 285°–290.° | |
| [28] Nitroethane. Isomer of ethyl nitrite. | $C_2 H_5 N O_2$. | 1.0582, 13.° | 113°–114.° | |

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## 3d. MISCELLANEOUS COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Methyl cyanate. | $C_2 H_3 N O$. | | a. 40.° | |
| [2] Ethyl " | $C_3 H_5 N O$. | .8981. | 60.° | |
| [3] Amyl " | $C_6 H_{11} N O$. | | a. 100.° | |
| [4] Allyl " | $C_4 H_5 N O$. | | 82.° | |
| [5] Phenyl " | $C_7 H_5 N O$. | 1.092, 50.° | 163.° | |
| [6] Methyl cyanurate. | $C_6 H_9 N_3 O_3$. | | 274.° | 175°–176° |
| [7] Ethyl " | $C_9 H_{15} N_3 O_3$. | | 253.° | 95.° |
| [8] Aceto-ethyl nitrate. | $C_6 H_{14} N_2 O_7$. | 1.0451, 19.° | 84°–86.° | |
| [9] Valeracetonitrile. | $C_{26} H_{48} N_4 O_6$. | .79. | 68°–70.° | |
| [10] Trioxamylidene. | $C_{15} H_{33} N O_3$. | .879, 22.° | | |
| [11] Cyanetholine. | $C_3 H_5 N O$. | 1.1271, 15.° | | |
| [12] Acetamide. s. | $C_2 H_5 N O$. | 1.11–1.13, 14.° | | |
| [13] Ethyl formamide. | $C_3 H_7 N O$. | .967, 2.° | 199.° | |
| [14] " acetamide. | $C_4 H_9 N O$. | .942, 4°5. | 205.° | |
| [15] " diacetamide. | $C_6 H_{11} N O_2$. | 1.0092, 20.° | 185°–192.° | |
| [16] Mucamide. s. | $C_6 H_{12} N_2 O_6$. | 1.589, 13°5. | | |
| [17] Acetanilide. s. | $C_8 H_9 N O_2$. | 1.099, 10°5. | 295.° | 101.° |
| [18] Urethane. } s. | $C_3 H_7 N O_2$. | .9862, 21.° | | |
| [19] Ethyl urethane. } | $C_5 H_{11} N O_2$. | .9862, 21.° | 174°–175.° | |
| [20] Asparagine. | $C_4 H_8 N_2 O_3 . H_2 O$ | 1.519, 14.° | | |
| [21] Aspartic acid. Active. | $C_4 H_7 N O_4$. | 1.6613. } | | |
| [22] " " Inactive. | " | 1.6632. } | | |
| [23] Hippuric acid. s. | $C_9 H_9 N O_3$. | 1.308. | | |
| [24] Ethyl hippurate. s. | $C_{11} H_{13} N O_3$. | 1.043, 23.° | | 44.° s. 32.° |
| [25] Urea. | $C H_4 N_2 O$. | 1.30, 12.° | | |
| [26] " | " | 1.35. | | |
| [27] " | " | 1.35. | | |
| [28] Benzoyl hydride hydrocyanate. | $C_8 H_7 N O$. | 1.124. | d. 170.° | |
| [29] Mono amido methyl phenol. | $C_7 H_9 N O$. | 1.108, 26.° | 216.° | |
| [30] ——————? | $C_6 H_{14} N_2 O$. | .924, 14.° | 200°–205.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Cyanoïl. | $C_6 H_{11} N O$. (?) | 1.009. | | |
| [2] Nitroxyl piperidine. | $C_5 H_{10} N_2 O$. | 1.0659, 15°5. | 240.° p. d. | |
| [3] Piperine. | $C_{17} H_{19} N O_3$. | 1.1931, 18.° | | 100°+. |
| [4] Caffeine. | $C_8 H_{10} N_4 O_2 . H_2 O$ | 1.23, 19.° | | |
| [5] " | " | | Subl. 184°7. | 177°8. |
| [6] Creatine hydrate. | $C_4 H_9 N_3 O_2 . H_2 O$. | 1.34–1.35. | | |
| [7] Codeine. | $C_{18} H_{21} N O_3 . H_2 O$ | 1.300. | | |
| [8] Morphia butyrate. | $C_{42} H_{54} N_2 O_{10}$. | 1.215, 13.° | | |
| [9] " oxalate. | $C_{36} H_{38} N_2 O_9 . 2aq$. | 1.286, 15.° | | |
| [10] " lactate. | $C_{40} H_{50} N_2 O_{12}$. | 1.3574. | | |
| [11] Indigo blue. | $C_8 H_5 N O$. | 1.35. | | |

## XLIII. Metallic Salts of Organic Acids.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [12] Lead formate. | $Pb\ C_2 H_2 O_4$. | 4.56, 11.° | | |
| [13] Copper " | $Cu\ C_2 H_2 O_4 . 2aq$. | 1.815, 20.° | | |
| [14] Sodium acetate. | $Na\ C_2 H_3 O_2$. | 1.421, 14.° | | |
| [15] " " | $Na\ C_2 H_3 O_2 . 6aq$. | 1.420. | | |
| [16] " " | " | 1.40, 12.° | | |
| [17] Silver " | $Ag\ C_2 H_3 O_2$. | 3.128. | | |
| [18] Lead " | $Pb(C_2 H_3 O_2)_2 . 3aq$. | 2.496. | | |
| [19] Barium " | $Ba(C_2 H_3 O_2)_2 . H_2 O$. | 2.19, 13°. | | |
| [20] Copper " | ——— | 1.914, 20.° | | |
| [21] Zinc " | $Zn(C_2 H_3 O_2)_2 . 3aq$. | 1.7175, 12.° | | |
| [22] Sodio uranic acetate. | $Na\ C_2 H_3 O_2 + 2(U\ C_2 H_3 O_3)$. | 2.55, 12.° | | |
| [23] " " " | | | | |
| [24] Cupro calcium " | | 1.4206. | | |
| [25] Potassium oxalate. | $K_2 C_2 O_4 . H_2 O$. | 2.104, m. of 2. | | |
| [26] " " | " | 2.08. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ammonium oxalate. | $Am_2 C_2 O_4 . H_2 O$. | 1.461, m. of 2. | | |
| [2] " " | " | 1.475. | | |
| [3] " " | " | 1.470. | | |
| [4] Silver " | $Ag_2 C_2 O_4$. | 4.96, 10.° | | |
| [5] Thallium " | $Tl_2 C_2 O_4$. | 6.31. | | |
| [6] Hydrogen sodium oxalate | $Na H C_2 O_4 . H_2 O$. | 2.315. | | |
| [7] " potassium " | $K H C_2 O_4$. | 1.965, m. of 2. | | |
| [8] " " " | " | 2.030. | | |
| [9] " " " | " | 2.088. | | |
| [10] " ammonium " | $Am H C_2 O_4 . H_2 O$. | 1.563, m. of 3. | | |
| [11] " " " | " | 1.556. | | |
| [12] " thallium " | $Tl H C_2 O_4 . H_2 O$. | 3.971. | | |
| [13] Potassium quadroxalate | $K H_3 C_4 O_8 . 2 H_2 O$. | 1.817. | | |
| [14] " " | " | 1.765. | | |
| [15] " " | " | 1.836. | | |
| [16] Ammonium " | $Am H_3 C_4 O_8 . H_2 O$. | 1.589, m. of 2. | | |
| [17] " " | " | 1.607. | | |
| [18] Potassium copper oxalate | $K_2 Cu C_4 O_8 . 2 H_2 O$. | 2.288, m. of 2. | | |
| [19] Ammonium " " | $Am_2 Cu C_4 O_8 . 2 H_2 O$. | 1.923. | | |
| [20] Uranium oxalate. | $U_2 O_2 . C_2 O_4 . 3 H_2 O$. | 2.98. | | |
| [21] Whewellite. | $Ca C_2 O_4$. | 2.50–2.75. | | |
| [22] Humboldtine. | $2 Fe C_2 O_4 . 3 H_2 O$. | 2.13–2.489. | | |
| [23] Ammonium succinate. | $Am_2 C_4 H_4 O_4$. | 1.367, 10.° | | |
| [24] Silver " | $Ag_2 C_4 H_4 O_4$. | 3.518, 10.° | | |
| [25] Lead " | $Pb C_4 H_4 O_4$. | 3.800, 10.° | | |
| [26] Sodium tartrate. | $Na_2 C_4 H_4 O_6 . 4 H_2 O$. | 1.794. | | |
| [27] Potassium " | $K_2 C_4 H_4 O_6$. | 1.975. | | |
| [28] " " | $K_2 C_4 H_4 O_6 . H_2 O$. | 1.960. | | |
| [29] Ammonium tartrate. | $Am_2 C_4 H_4 O_6$. | 1.566. | | |
| [30] " " | " | 1.523. | | |
| [31] Silver " | $Ag_2 C_4 H_4 O_6$. | 3.4321. | | |
| [32] Thallium " | $(Tl_2 C_4 H_4 O_6)_2 . H_2 O$. | 4.658. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Hydrogen potassium tartrate. | $K\,H.\,C_4\,H_4\,O_6$. | 1.943. | | |
| [2] " " " | " | 1.973. | | |
| [3] " " " | " | 1.956. | | |
| [4] " ammonium " | $Am\,H.\,C_4\,H_4\,O_6$. | 1.680. | | |
| [5] " thallium " | $Tl\,H.\,C_4\,H_4\,O_6$. | 3.496. | | |
| [6] Sodium potassium " | $Na\,K.\,C_4\,H_4\,O_6.\,4\,H_2\,O$. | 1.74. | | |
| [7] " " " | " | 1.767. | | |
| [8] " " " | " | 1.790. | | |
| [9] " ammonium " | $Na\,Am.\,C_4\,H_4\,O_6.4H_2O$. | 1.58. | | |
| [10] " " " | " | 1.576. | | |
| [11] " " " | " | 1.587. | | |
| [12] Potassium " " | $K\,Am.\,C_4\,H_4\,O_6.\,4\,H_2O$. | 1.700. | | |
| [13] Potassium tartar emetic. | $(K(SbO)C_4H_4O_6)_2.H_2O$. | 2.5569. | | |
| [14] " " " | " | 2.607. | | |
| [15] " " " | " | 2.588. | | |
| [16] Thallium " " | $(Tl(SbO)C_4H_4O_6)_2.H_2O$. | 3.99. | | |
| [17] Potassium racemate. | $K_2\,C_4\,H_4\,O_6.\,2\,H_2\,O$. | 1.58. | | |
| [18] Silver " | $Ag_2\,C_4\,H_4\,O_6$. | 3.7752. | | |
| [19] Thallium " | $(Tl_2\,C_4\,H_4\,O_6)_2.\,H_2\,O$. | 4.659. | | |
| [20] Racemo-emetic. | $(K(SbO)C_4H_4O_6)_2.H_2O$. | 2.4768. | | |
| [21] Silver malate. | $Ag_2\,C_4\,H_4\,O_5$. | 4.0016. | | |
| [22] Hydrogen ammonium malate. | $Am\,H.\,C_4\,H_4\,O_5$. | 1.55. | | |
| [23] Thallium picrate. | $Tl\,C_6\,H_2\,(N\,O_2)_3\,O$. | 3.039. | | |
| [24] Calcium hippurate. | $2(CaC_{18}H_{16}N_2O_6).3H_2O$. | 1.318. | | |
| [25] Potassium borotartrate. | $K\,B\,O_2.\,C_4\,H_4\,O_5$. | 1.832. | | |

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## XLIV. Compounds Containing C, H, and Cl.

Including the Chlorides of Carbon Produced by Substitution.

### 1st. CHLORIDES OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Methyl chloride. | $C H_3 . Cl$. | | −20° to −22.° | |
| [2] Ethyl " | $C_2 H_5 . Cl$. | .874, 5.° | 12.° | |
| [3] " " | " | .92138, 0.° | 11.° | |
| [4] " " | " | | 11°–12.° | |
| [5] " " | " | .9253, 0.° | 11°–13.° | |
| [6] " " | " | .9176, 8.° | 12°.18. | |
| [7] Propyl " | $C_3 H_7 . Cl$. | | a. 40.° | |
| [8] " " iso. | " | .874, 10.° | 36°–38.° | |
| [9] " " | " | | 52.° | |
| [10] " " | " | .9156, 0.° | | |
| [11] " " | " | .8918, 19°.75. | 46°.5. | |
| [12] " " | " | .8671, 39.° | | |
| [13] Butyl " | $C_4 H_9 . Cl$. | | 70°–75.° | |
| [14] " " | " | .880. | 70.° | |
| [15] " " | " | | 65°–70.° | |
| [16] " " | " | .9074, 0.° | 77°.6. | |
| [17] " " | " | .8874, 20.° | 741.3 m. m. | |
| [18] " " | " | .8953, 0.° | | |
| [19] " " | " | .8651, 27°.8 | 69.° | |
| [20] " " | " | .8281, 59.° | | |
| [21] Amyl " | $C_5 H_{11} . Cl$. | | 102.° | |
| [22] " " | " | | 100°–101.° | |
| [23] " " | " | .8859, 0.° | 100°.6–101.° | |
| [24] " " | " | .8625, 25°.1. | | |
| [25] " " | " | .89584, 0.° | 101°.75.° | |
| [26] " " iso. | " | .883, 0.° | 90.° | |
| [27] " " | " | | 98°–103.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Amyl chloride. | $C_5H_{11}.Cl.$ | .9013, 0.° | | |
| [2] | " " | " | .8834, 20.° | 106°6. | |
| [3] | " " | " | .868, 40.° | 739.8 m. m. | |
| [4] | " " | " | 8750, 20.° | 101.° | |
| [5] | " " | " | .8777, 20.° | 101.° | |
| [6] | Hexyl " | $C_6H_{13}.Cl.$ | .892, 16.° | 125°–128.° | |
| [7] | " " Beta. | " | | 120°–130.° | |
| [8] | " " | " | .892, 23.° | 125°–130.° | |
| [9] | " " iso. | " | .8943, 14.° | | |
| [10] | " " " | " | .8874, 22.° | 122.° | |
| [11] | " " " | " | .8759, 34.° | | |
| [12] | Heptyl " | $C_7H_{15}.Cl.$ | .9983, 15.° | 175.° | |
| [13] | " " | " | .890, 20.° | 148°–152.° | |
| [14] | " " From Azelaic Acid. | " | .8737, 18°5. | 151°–153.° | |
| [15] | " " | " | .8725, 20.° | | |
| [16] | " " | " | .8814, 16°5. | | |
| [17] | " " From Ethyl amyl. | " | .8780, 18°5. | 146°–148.° | |
| [18] | " " | " | .8757, 22.° | | |
| [19] | " " From petroleum. | " | .8965, 19.° | 149.° | |
| [20] | " " | " | .891, 19.° | 150°–152.° | |
| [21] | Octyl " | $C_8H_{17}.Cl.$ | | 175.° | |
| [22] | " " | " | .892, 18.° | 170°–172.° | |
| [23] | " " | " | .895, 16.° | 168°–172.° | |
| [24] | " " | " | | 162°–167.° | |
| [25] | " " | " | .8802, 16.° | 179°5–180°5. | |
| [26] | " " iso. | " | .8834, 10°5. | 165.° | |
| [27] | " " " | " | .8617, 36.° | | |
| [28] | Nonyl " | $C_9H_{19}.Cl.$ | .899, 16.° | 196.° | |
| [29] | Decyl " | $C_{10}H_{21}.Cl.$ | | 200°–204.° | |
| [30] | " " | " | | 190°–200.° | |
| [31] | Dodecatyl " | $C_{12}H_{25}.Cl.$ | .933, 22.° | 242°–245.° | |
| [32] | Myristyl " | $C_{14}H_{29}.Cl.$ | | 280.° | |
| [33] | Cetyl " | $C_{16}H_{33}.Cl.$ | .8412, 12.° | 289.° p. d. | |

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## 2d. CHLORIDES OF THE ETHYLENE SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Methylene chloride. | $C H_2 . Cl_2$. | | 40°–42.° | |
| [2] " " | " | 1.360, 0.° | 39°5–40°5. | |
| [3] Ethylene " | $C_2 H_4 . Cl_2$. | 1.256, 12.° | 82°5. | |
| [4] " " | " | | 86.° | |
| [5] " " | " | 1.247, 18.° | 82°4. | |
| [6] " " | " | | 85°8. | |
| [7] " " | " | 1.28034, 0.° | 84°92. | |
| [8] " " | " | | 85.° | |
| [9] " " | " | 1.2562, 20.° | 85.° | |
| [10] " " | " | 1.26, 14.° | 85.° | |
| [11] Propylene " | $C_3 H_6 . Cl_2$. | | 100°–103.° | |
| [12] " " | " | 1.151. | 104.° | |
| [13] Butylene " | $C_4 H_8 . Cl_2$. | 1.112, 18.° | 123.° | |
| [14] " " | " | 1.0953, 0.° | 122°3. | |
| [15] " " | " | 1.0751, 20°7. | | |
| [16] Amylene " | $C_5 H_{10} . Cl_2$. | 1.058, 9.° | 141°–147.° | |
| [17] " " | " | 1.2219, 0.° | 145.° | |
| [18] Heptylene " | $C_7 H_{14} . Cl_2$. | | 191.° | |
| [19] " " | " | 1.0295, 10.° | | |
| [Isomers of some of the above compounds may be found in the next table.] | | | | |

## 3d. SUBSTITUTION DERIVATIVES OF THE TWO PRECEDING SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [20] Chlorinated methyl chloride. | $C H_2 Cl_2$. | 1.344, 18.° | 30°5. | |
| [21] Chloroform. | $C H Cl_3$. | | 70.° | |
| [22] " | " | 1.48, 18.° | 60°8. | |
| [23] " | " | 1.491, 17.° | 61.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Chloroform. | C H $Cl_3$. | 1.493–1.497. | | |
| [2] | " | " | 1.413. ) Two | | |
| [3] | " | " | 1.496, 12.° ) products. | | |
| [4] | " | " | 1.500, 15°5. | | |
| [5] | " | " | 1.52523, 0.° | 63°5. | |
| [6] | " | " | 1.512, 12.° | | |
| [7] | " | " | 1.49. | | |
| [8] | " | " | 1.472, 16°5. | | |
| [9] | " | " | 1.507, 17.° | | |
| [10] | Chlorinated ethyl chloride. | $C_2$ $H_4$ $Cl_2$. | 1.174, 17.° | 64.° | |
| [11] | " " " | " | | 58. | |
| [12] | " " " | " | 1.24074, 0.° | 64°8. | |
| [13] | " " " | " | 1.189, 4°3. | 59°–61.° | |
| [14] | " " " | " | 1.198, 6°5.° | 57°–59.° | |
| [15] | " " " | " | | 62.° | |
| [16] | Dichlorinated " " | $C_2$ $H_3$ $Cl_3$. | 1.372, 16.° | 75.° | |
| [17] | " " | " | 1.34651, 0.° | 74°9. | |
| [18] | " " | " | | 74°5. | |
| [19] | Chlorinated ethylene chloride. | $C_2$ $H_3$ $Cl_3$. | 1.422, 17.° | 115.° | |
| [20] | " " " | " | 1.42234, 0.° | 114°2. | |
| [21] | Trichlorinated ethyl chloride. | $C_2$ $H_2$ $Cl_4$. | 1.530, 17.° | 102.° | |
| [22] | Bichlorinated ethylene chloride. | $C_2$ $H_2$ $Cl_4$. | 1.576, 19.° | 135.° | |
| [23] | " " | " | 1.61158, 0.° | 138°6. | |
| [24] | " " | " | 1.614, 0.° | 147.° | |
| | [Compare the above with acetylene tetrachloride.] | | | | |
| [25] | Pentachloro dimethyl. | $C_2$ H $Cl_5$. | 1.663, 0.° | 153.° | |
| [26] | " " | " | 1.644. | 146.° | |
| [27] | " " | " | 1.66267, 0.° | 153°8. | |
| [28] | " " | " | 1.71, 0.° ) | 158.° | |
| [29] | " " | " | 1.69, 13.° ) | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Dicarbon hexachloride. | $C_2 Cl_6$. | 1.619. | 122.° | |
| [2] " " | " | | | 182°–183? |
| [3] Dichlorinated ethylene. | $C_2 H_2 Cl_2$. | 1.250, 15.° | 35°–40.° | |
| [4] Chlorinated propylene. | $C_3 H_5 Cl$. | | 30.° | |
| [5] " " | " | .918, 9.° | 23.° | |
| [6] " " | " | .9307, 0.° | 25°.5. | |
| [7] " " | " | .931, 0.° | 23.° | |
| [Compare with allyl chloride.] | | | | |
| [8] Iso trichloro propylene. | $C_3 H_3 Cl_3$. | 1.387, 14.° | 115.° | |
| [Compare with chloro dichlorglycide. | | | | |
| [9] Chlorinated propylene chloride. | $C_3 H_5 Cl_3$. | 1.347. | 170.° | |
| [Compare with allyl trichloride.] | | | | |
| [10] Dichlorinated propylene chloride. | $C_3 H_4 Cl_4$. | 1.548. | 195°–200.° | |
| [Compare with tetrachloroglycide, and dichloracetone chloride.] | | | | |
| [11] Trichlorinated propylene chloride. | $C_3 H_3 Cl_5$. | | 220°–225.° | |
| [Compare with trichloracetone chloride.] | | | | |
| [12] Tetrachlorinated propylene chloride. | $C_3 H_2 Cl_6$. | 1.626. | 240°–245.° | |
| [13] Pentachlorinated propylene chloride. | $C_3 H Cl_7$. | 1.731. | 260.° | |
| [14] Hexchlorinated propylene chloride. | $C_3 Cl_8$. | 1.860. | 280.° | |
| [15] Chlorinated amyl chloride. | $C_5 H_{10} Cl_2$. | 1.05, 24.° | a. 130.° | |
| [16] " " " | " | 1.194, 0.° | 155°–160.° | |
| [Compare with amylene chloride.] | | | | |
| [17] Dichlorinated amyl chloride. | $C_5 H_9 Cl_3$. | | 160°–190.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Dichlorinated amyl chloride. | $C_5 H_9 Cl_3$. | 1.33, 13.° | 185°–190.° | |
| [2] Chlorinated amylene. | $C_5 H_9 Cl$. | .9992, 0.° | 90°–95.° | |
| [3] Dichlorinated amylene chloride. | $C_5 H_8 Cl_4$. | 2.4292. | 220°–230.° | |
| [4] Chlorinated hexyl chloride. | $C_6 H_{12} Cl_2$. | 1.087, 20.° | 180°184.° | |
| [Compare with hexylene chloride.] | | | | |
| [5] Dichlorinated hexyl chloride. | $C_6 H_{11} Cl_3$. | 1.193, 21.° | 215°–218.° | |
| [6] Pentachlorinated hexyl chloride. | $C_6 H_8 Cl_6$. | 1.598, 20.° | 285°–290.° | |
| [7] Chlorinated heptyl chloride. | $C_7 H_{14} Cl_2$. | | 190.° | |
| [8] Chlorinated heptylene. | $C_7 H_{13} Cl$. | | 155.° | |
| [9] Chlorinated diamylene chloride. | $C_{10} H_{19} Cl_3$. | 1.1638, 0.° | 240°–250.° | |

## 4th. DERIVATIVES OF THE BENZOL SERIES, INCLUDING ISOMERS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [10] Mono chloro benzol, or [11] Phenyl chloride. | $C_6 H_5 Cl$. | | 137.° | |
| | " | | 136.° | |
| [12] " " | " | 1.1499, 0.° | | |
| [13] " " | " | 1.1347, 10.° | 132°5. | |
| [14] " " | " | 1.1258, 20.° | 767 m. m. | |
| [15] " " | " | 1.1188, 30.° | | |
| [16] " " | " | 1.1199, 0.° | | |
| [17] " " | " | 1.1085, 10.° | 136.° | |
| [18] " " | " | 1.099, 20.° | 767 m. m. | |
| [19] " " | " | 1.092, 30.° | | |
| [20] " " | " | 1.118. | | |

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| | Name. | | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|---|
| [1] | Mono chloro benzol. | | $C_6 H_5 Cl$. | 1.177,–40.° | | |
| [2] | " " | | " | .980, 133.° | | |
| [3] | " " | | " | 1.1293, 0.° | 138.° | —40.° |
| [4] | Dichloro benzol. | | $C_6 H_4 Cl_2$. | 1.459. | | |
| [5] | " | s. | " | 1.250, 53.° | | |
| [6] | " | | " | 1.123, 171.° | | |
| [7] | " | s. | " | 1.4581, 20°5. | | |
| [8] | " | | " | 1.241, 63.° | 171.° | 53. |
| [9] | " | | " | 1.2062, 93.° | | |
| [10] | " | | " | 1.1366, 166.° | | |
| [11] | Trichloro benzol. | | $C_6 H_3 Cl_3$. | 1.457, 7.° | 210.° | |
| [12] | " | | " | 1.575. | | |
| [13] | " | s. | " | 1.457, 17.° | | |
| [14] | " | | " | 1.227, 206.° | | |
| [15] | " | s. | " | 1.574, 10.° | | |
| [16] | " | l. | " | 1.4658, 10.° | | |
| [17] | " | | " | 1.4460, 26.° | 206.° | 17.° |
| [18] | " | | " | 1.4111, 56.° | | |
| [19] | " | | " | 1.2427, 196.° | | |
| [20] | Tetrachloro benzol. | | $C_6 H_2 Cl_4$. | 1.748. | | |
| [21] | " | | " | 1.448, 139.° | | |
| [22] | " | | " | 1.315, 240.° | | |
| [23] | " | s. | " | 1.7344, 10.° | | |
| [24] | " | | " | 1.4339, 149.° | | |
| [25] | " | | " | 1.3958, 179.° | 240.° | 139.° |
| [26] | " | | " | 1.3281, 230.° | | |
| [27] | Pentachloro benzol. | | $C_6 H Cl_5$. | 1.625, 74.° | 270.° | |
| [28] | " | | " | 1.370, 270.° | | |
| [29] | " | | " | 1.8422, 10.° | | |
| [30] | " | | " | 1.8342, 16°5. | | |
| [31] | " | | " | 1.6091, 84.° | 272.° | 74.° |
| [32] | " | | " | 1.5732, 114.° | | |
| [33] | " | | " | 1.3824, 261.° | | |

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[30] Jungfleisch. 21. 353.
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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Pentachloro benzol. Two | $C_6 H Cl_5$. | | | 85.° |
| [2] | " modifications. | " | | | 198°–199.° |
| [3] | Hexchloro benzol. | $C_6 Cl_6$. | | | 231.°s. 226° |
| [4] | " | " | 1.585, 228.° | | |
| [5] | " | " | 1.437, 317.° | | |
| [6] | " | " | 1.569, 236.° | | |
| [7] | " | " | 1.5191, 266.° | 326.° | 226.° |
| [8] | " | " | 1.4624, 306.° | | |
| [9] | Monochlorotoluol. | $C_7 H_7 Cl$. | 1.117, 0.° | 175°–176.° | |
| [10] | " | " | 1.080, 14.° | 164. | |
| [11] | " | " | | 157°–158.° | |
| [12] | Benzyl chloride. | " | 1.1131–1.1179. | | |
| [13] | " " | " | 1.107, 14.° | 183.° | |
| [14] | Dichlorotoluol. | $C_7 H_6 Cl_2$ | 1.245, 16.° | 206.° | |
| [15] | " | " | | 206.° | |
| [16] | " | " | 1.256, 13.° | 202.° | |
| [17] | " | " | 1.2557, 14.° | 207. | |
| [18] | Dichlorinated benzyl chloride. | $C_7 H_5 Cl_3$ | 1.44, 0.° | 135°–145.° 10 m. m. | |
| [19] | " " | " | | 240° p. d. 760 m. m. | |
| [20] | Chlorinated dichlor-toluol. | " | 161, 13.° | 216°–218.° | |
| [21] | Benzo trichloride. | " | 1.380, 14.° | 224.° | |
| [22] | Tetrachlorotoluol. | $C_7 H_4 Cl_4$. | | 270.° | 92°–95.° |
| [23] | " | " | 1.495, 14.° | 255.° | |
| [24] | Dichlorotoluol dichlo-ride. | " | 1.518, 22.° | 257.° | |
| [25] | Trichlortoluol chloride. | " | 1.547, 23.° | 273.° | |
| [26] | Dichlorinated chloro-benzol. | " | 1.74, 13.° | 244°–246.° | |
| [27] | " " | " | 1.76, 13.° | 246°–248.° | |
| [28] | Chlorosalylic trichloride | " | 1.51, l. | 260.° | 30.° |
| [29] | Pentachlorotoluol. | $C_7 H_3 Cl_5$. | | 300.° | 218.° |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Dichlortoluol trichloride. | $C_7 H_3 Cl_5$. | 1. 587,21.° | 273.° | |
| [2] Trichlortoluol dichloride. | " | 1.607, 22.° | 280°–281.° | s. 0.° |
| [3] Tetrachlortoluol chloride. | " | 1.634, 25.° | 296°–297.° | |
| [4] " dichloride. | $C_7 H_2 Cl_6$. | 1.704, 25.° | 305°–306.° | |
| [5] Monochloroxylol. | $C_8 H_9 Cl$. | | 193.° | |
| [6] " | " | | 190°–195.° | |
| [7] Dichloroxylol. | $C_8 H_8 Cl_2$. | | 240°–245.° | 100.° |
| [8] " | " | | 222. | |
| [9] Trichloroxylol. | $C_8 H_7 Cl_3$. | | 254°–256.° | |

## 5th. MISCELLANEOUS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [10] Allyl chloride. | $C_3 H_5 Cl$. | .934, 0.° | 44°–45.° | |
| [11] " " [Compare with chlorinated propylene.] | " | .9547, 0.° | 45°.5–47.° | |
| [12] Allyl trichloride. | $C_3 H_5 Cl_3$. | 1.41, 0.° | 154°–157.° | |
| [13] Allylene chloride. | $C_3 H_4 Cl_2$. | 1.170, 24°.5. | 84°.4. | |
| [14] Acetylene tetrachloride. | $C_2 H_2 Cl_4$. | 1.614, 0.° | 147.° | |
| [15] " " | " | 1.578, 24°.3. | | |
| [16] " " | " | 1.522, 100°.1. | | |
| [17] Methylchloracetol. | $C_3 H_6 Cl_2$. | 1.117, 0.° | 70.° | |
| [18] " [Compare with propylene chloride.] | " | 1.06, 16.° | 69.° | |
| [19] Epidichlorhydrin. | $C_3 H_4 Cl_2$. | | 120.° | |
| [20] " | " | 1.21, 20.° | 101°–102.° | |
| [21] Tetrachloroglycide. [Compare with dichlorinated propylene chloride.] | $C_3 H_4 Cl_4$. | 1.496, 17.° | 164.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Chloro dichloroglycide. [Compare with isotrichloropropylene.] | $C_3 H_3 Cl_3$. | 1.414, 20.° | 142.° | |
| [2] (?) s. | $C_3 H_4 Cl_4$. | 1.55. | 185.° | 145.° |
| [3] Chlorostyrol. Beta. | $C_8 H_7 Cl$. | 2.112, 22°3. | 199°–204.° | |
| [4] Chloroanethol. | $C_{10} H_{12} Cl_2$. | 1.1154, 0.° | 257.° | —6.° |
| [5] Chloronicene. | $C_5 H_5 Cl$. | 1.141, 10.° | 292°–294.° | |
| [6] Naphtyl chloride. | $C_{10} H_7 Cl$. | 1.2052, 6°2. | 259°–262.° | |
| [7] " " | " | 1.2028, 6°4. | a. 260.° | |
| [8] Camphryl " | $C_9 H_{13} Cl$. | 1.038, 14.° | 205.° | |
| [9] Geraniol " | $C_{10} H_{17} Cl$. | 1.020, 20.° | | |
| [10] Caoutchin hydrochlorate. | $C_{10} H_{17} Cl$. | 1.433. | | |
| [11] Deriv. of oil of Pinus pumilio. | $C_{10} H_{17} Cl$. | .982, 17.° | | |
| [12] Deriv. of oil of Muscat nuts. | $C_{10} H_{17} Cl$. | 9827, 15.° | 194.° | |
| [13] Deriv. of Bergamot oil. | $6(C_{10}H_{16})2HCl.H_2O$ | 896. | | |

## XLV. Compounds Containing C. H. O. Cl. and C. O. Cl.

### 1st. SUBSTITUTION COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [14] Dichlorinated methyl oxide | $C_2 H_4 Cl_2 O$. | 1.315, 20.° | 105.° | |
| [15] Tetrachlorinated " " | $C_2 H_2 Cl_4 O$. | 1.606, 20.° | a. 130.° | |
| [16] Hexchlorinated " " | $C_2 Cl_6 O$. | 1.594. | a. 100.° | |
| [17] Dichlorinated ethyl " | $C_4 H_8 Cl_2 O$. | 1.174, 23. | 140°–147.° | |
| [18] Tetrachlorinated " " | $C_4 H_6 Cl_4 O$. | 1.5008. | | |
| [19] Perchlorinated " " | $C_4 Cl_{10} O$. | | | 69.° |
| [20] " " " | " | 1.9, 14°5. | 300.° d. | 69.° |
| [21] Pentachlorinated " " | $C_4 H_5 Cl_5 O$. | 1.645. | | |
| [22] Monochloracetic acid. | $C_2 H_3 Cl O_2$. | 1.366, 73.° $H_2O$ at 10°=1. | 185°–187°5. | s. 62.° |
| [23] " " | " | 1.3947, 73.° $H_2O$ at 73°=1. | 755.7. m. m. | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Dichloracetic acid. l. | $C_2 H_2 Cl_2 O_2$. | 1.5216, 15.° | 195.° | |
| [2] Trichloracetic " l. | $C_2 H Cl_3 O_2$. | 1.617, 46.° | 195°–200.° | 46.° |
| [3] " " | " | | 195.° | 52°3.s.44°8. |
| [4] Chloropropionic acid. | $C_3 H_5 Cl O_2$. | 1.28, 0.° | 186.° | |
| [5] Chlorocarbonic ether. | $C_3 H_5 Cl O_2$. | 1.133, 15.° | 94.° | |
| [6] Tetrachlorinated methyl formate. | $C_2 Cl_4 O_2$. | 1.724, 12.° | 180°–185.° | |
| [7] Dichlorinated ethyl " | $C_3 H_4 Cl_2 O_2$. | 1.261, 16.° | | |
| [8] Hexchlorinated " " | $C_3 Cl_6 O_2$. | 1.705, 18.° | 200.° | |
| [9] Dichlorinated methyl acetate. | $C_3 H_4 Cl_2 O_2$. | 1.25. | 145°–148.°p.d. | |
| [10] Hexchlorinated " " | $C_3 Cl_6 O_2$. | 1.691, 18.° | 200.° | |
| [11] Dichlorinated ethyl " | $C_4 H_6 Cl_2 O_2$. | 1.301, 12.° | 110.° | |
| [12] " " " | " | 1.29. | 153.° | |
| [13] Trichlorinated " " | $C_4 H_5 Cl_3 O_2$. | 1.367. | 164.° | |
| [14] " " " | " | 1.35, 20.° | 164.° | |
| [15] Tetrachlorinated " " | $C_4 H_4 Cl_4 O_2$. | 1.485, 25.° | | |
| [16] Hexchlorinated " " | $C_4 H_2 Cl_6 O_2$. | 1.698, 23°5. | | |
| [17] Heptachlorinated " " | $C_4 H Cl_7 O_2$. | 1.692, 24°5. | | |
| [18] Perchlorinated " " | $C_4 Cl_8 O_2$. | 1.79, 25.° | 245.° | |
| [19] " " " | " | 1.78, 22.° | | |
| [20] Chloropropionic ether. | $C_5 H_8 Cl_2 O_2$. | 1.2493, 0.° | 160.° | |
| [21] Chlorobutyric " | | 1.063, 17°5. | 156°–160.° | |
| [22] Chloroenanthic " | | 1.2912, 16°5. | | |
| [23] Monochloracetone. | $C_3 H_5 Cl O$. | 1.19. | 119.° | |
| [24] " | " | 1.14, 14.° | 117.° | |
| [25] " | " | 1.162, 16.° | 119.° | |
| [26] " | " | 1.18, 16.° | 118°–120.° | |
| [27] Dichloracetone. | $C_3 H_4 Cl_2 O$. | 1.331. | | |
| [28] " | " | | 116°5. | |
| [29] " | " | 1.236, 21.° | 121°5.° | |
| [30] " | " | | 120.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Pentachloracetone. | $C_3 H Cl_5 O$. | 1.6–1.7. | a. 190.° | |
| [2] Hexchloracetone. | $C_3 Cl_6 O$. | 1.75, 10.° | 200°–201.° | |
| [3] " | " | 1.744, 12.° | 204.° | |
| [4] Monochloracetal. | $C_6 H_{13} Cl O_2$. | 1.0195. | 150°–160.° | |
| [5] Dichloracetal. | $C_6 H_{12} Cl_2 O_2$. | 1.1383, 14.° | a. 180.° | |
| [6] | $C_5 H_{11} Cl O_2$. | 1.056, 13°5. | a. 137.° | |
| [7] Deriv. of chlorinated ether | $C_5 H_{11} Cl O$. | .9842, 0.° | 117°–118. | |
| [8] " " " " | $C_6 H_{13} Cl O$. | .9735, 0.° | 137.° | |
| [9] Monochloraldehyde. | $C_2 H_3 Cl O$. | 1.23. | | |
| [10] Perchloraldehyde. | $C_2 Cl_4 O$. | 1.603, 18.° | 118.° | |
| [11] Chloroxethose. | $C_4 Cl_6 O$. | 1.654, 21.° | 210.° | |
| [12] Parachloralide. | $C_5 H_2 Cl_6 O_3$. | 1.5765, 14.° | 182.° | |
| [13] Chloral. | $C_2 H Cl_3 O$. | 1.502, 18.° | 94.° | |
| [14] " | " | 1.5183, 0.° | 98°1–99.° | |
| [15] " | " | 1.4903, 22°2. | | |
| [16] Chloral hydrate. | | | 145.° | 56.° |
| [17] " " | | | 145.° | 50.° |
| [18] " " | | | 115.° | s. 40°2. |
| [19] " methylate. | | | 98.° | |
| [20] " ethylate. | | 1.143, 40.° l. | 115°–116.° | s. 40.° |
| [21] " amylate. | | 1.234, 25.° | 143.° | 24.° |
| [22] Chlorolactic ether. | $C_5 H_9 Cl O_2$. | 1.097, 0.° | 144.° | |
| [23] Chloromaleic " | $C_8 H_{11} Cl O_4$. | 1.15, 11.° | 250°–260.° | |
| [24] Chloroniceic " | $C_8 H_9 Cl O_2$. | .981, 10.° | 230.° | |
| [25] " acid. | $C_6 H_5 Cl O_2$. | 1.29, melted. | 215.° | 150.° |
| [26] Deriv. of benzoic ether. | $C_{18} H_{16} Cl_6 O_3$. | 1.346, 10°8. | 188°–190.° | |
| [27] Tetrachlor. ethyl camphorate. | $C_{14} H_{20} Cl_4 O_4$. | 1.386, 14.° | | |
| [28] Deriv. of oleic acid. | $C_{18} H_{32} Cl_2 O_2$. | 1.082, 7°9. | Begins, 190.° | |
| [29] " sodium citrate. | $C_5 Cl_{10} O_2$. | 1.66. | 190.° | |
| [30] " dichlortoluol. | $C_9 H_{11} Cl O$. | 1.121, 14.° | 215°–220.° | |
| [31] Monochlor methyl phenol | $C_7 H_7 Cl O$. | 1.182, 9.° | 200.° | |
| [32] Monochlor ethyl phenol. | $C_8 H_9 Cl O$. | 1.106, 9.° | 210.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Chloracetyl chloride. | $C_2 H_2 Cl_2 O$. | 1.495, 0.° | 105.° | |
| [2] Chlorbutyryl " | $C_4 H_6 Cl_2 O$. | 1.257, 17.° | 129°–132.° | |
| [3] Methyl chlorphenetol. *a.* | | 1.127, 19°5. | 210°–220.° | |
| [4] " *β.* | | 1.131, 18.° | 210°–220.° | |

## 2d. CHLORHYDRINS.

For Trichlorhydrin and Epidichlorhydrin, See Compounds of C. H. and Cl.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [5] Mono-chlorhydrin. | $C_3 H_7 Cl O_2$. | 1.31. | 227.° | |
| [6] Di-chlorhydrin. | $C_3 H_6 Cl_2 O$. | 1.37. | | |
| [7] " " | " | | 180.° | |
| [8] " " | " | 1.3699, 9.° | 175°–180.° | |
| [9] " " | " | 1.355, 17°5. | 180°–183.° | |
| [10] Epi-chlorhydrin. | $C_3 H_5 Cl O$. | 1.204, 0.° | 117.° | |
| [11] " " | " | 1.194, 11.° | 118°–119.° | |
| [12] Amyl-chlorhydrin. | $C_8 H_{17} Cl O_2$. | 1.00, 20.° | 235.° | |
| [13] Diethyl-chlorhydrin. | $C_7 H_{15} Cl O_2$. | 1.03, 10°5. | | |
| [14] " " | " | 1.005, 17.° | 184.° | |
| [15] Diethylglycol chlorhydrin | $C_{10} H_{21} Cl O_4$. | 1.11, 17.° | 285.° | |
| [16] Propyl " " | $C_3 H_7 Cl O$. | 1.1302, 0.° | 127.° | |
| [17] " " " iso. | " | 1.247. | 126°–128.° | |
| [18] Propyl phycite trichlorhydrin. | $C_3 H_5 Cl_3 O$. | 1.4324, 14.° | 172°–173.° | |
| [19] Heptylene chlorhydrin. | $C_7 H_{15} Cl O$. | 1.014, 0.° | 206°–208.° | |
| [20] " " | " | 1.001, 14.° | | |
| [21] Octylene " | $C_8 H_{17} Cl O$. | 1.003, 0.° | | |
| [22] " " | " | .987, 31.° | | |
| [23] " aceto chlorhydrin. | $C_{10} H_{19} Cl O_2$. | 1.026, 0.° | 225.° | |
| [24] " " " | " | 1.011, 18.° | | |
| [25] Aceto dichlorhydrin. | $C_5 H_8 Cl_2 O_2$. | 1.283, 11.° | 202°–203.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Butyro dichlorhydrin. | $C_7 H_{12} Cl_2 O_2$. | 1.194, 11.° | 226°–227.° | |
| [2] Valero " | $C_8 H_{14} Cl_2 O_2$. | 1.149, 11.° | 245.° | |
| [3] Diaceto " | $C_7 H_{11} Cl O_4$. | 1.243, 4.° | 245.° | |
| [4] Benzo " | | 1.441, 8.° | | |

## 3d. MISCELLANEOUS COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [5] Ethylidene oxychloride. | $C_4 H_8 Cl_2 O$. | 1.1376. 12.° | 116°–117.° | |
| [6] Glycol chloracetin. | $C_4 H_7 Cl O_2$. | 1.1783, 0.° | 145.° | |
| [7] " chlorbutyrin. | $C_6 H_{11} Cl O_2$. | 1.0854, 0.° | a. 190.° | |
| [8] Acetyl chloride. | $C_2 H_3 Cl O$. | 1.125, 11.° | 55.° | |
| [9] " " | " | 1.1305, 0.° | 55°–56.° | |
| [10] " " | " | 1.1072, 16.° | | |
| [11] Propionyl chloride. | $C_3 H_5 Cl O$. | | a. 80.° | |
| [12] Butyryl " | $C_4 H_7 Cl O$. | | a. 95.° | |
| [13] Valeryl " | $C_5 H_9 Cl O$. | 1.005, 6.° | 115°–120.° | |
| [14] Pelargonyl " | $C_9 H_{17} Cl O$. | | 220.° | |
| [15] Allyl alcohol chloride. | $C_3 H_6 Cl_2 O$. | 1.3799, 0.° | 180°–184.° | |
| [16] " " " | " | 1.3681, 11°5. | | |
| [17] Succinyl " | $C_4 H_4 Cl_2 O_2$. | 1.39. | 190.° | |
| [18] Pyrocitryl " | $C_5 H_4 Cl_2 O_2$. | 1.40, 15.° | 175.° | |
| [19] Benzoyl " | $C_7 H_5 Cl O$. | 1.196. | | |
| [20] " " | " | | 195.° | |
| [21] " " | " | 1.250, 15.° | 195°–200.° | |
| [22] " " | " | 1.2324, 0.° | 198°–198°3. | |
| [23] " " | " | 1.2142, 19.° | | |
| [24] Toluyl " | $C_8 H_7 Cl O$. | 1.175. | 214°–216.° | |
| [25] Cumyl " | $C_{10} H_{11} Cl O$. | 1.07, 15.° | 258°–260.° | |
| [26] Cinnamyl " | $C_9 H_7 Cl O$. | 1.207, 16.° | 262.° | |
| [27] Anisyl " | $C_8 H_7 Cl O_2$. | 1.261, 15.° | 262.° | |

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## XLVI. Compounds Containing C. Cl. N.; C. H. Cl. N.; C. Cl. N. O.; and C. H. Cl. N. O.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Chloraceto nitrile. | $C_2 Cl_3 N$. | 1.444. | 81.° | |
| [2] Dichloro ethyl cyanide. | $C_3 H_3 Cl_2 N$. | 1.431, 15.° | 104°–107.° | |
| [3] Chlorotoluidine. | $C_7 H_8 Cl N$. | 1.151, 20.° | 222.° | |
| [4] " | " | | 241.° | 29°5. |
| [5] " alpha. | " | 1.1855, 20.° | 238.° | |
| [6] " beta. | " | 1.203, 19.° | 237°–242.° | |
| [7] Parachlorotoluidine. | $C_7 H_8 Cl N$. | 1.175, 18.° | 236.° | |
| [8] Chloropicrin. | $C Cl_3 N O_2$. | 1.6657. | 120.° | |
| [9] Dinitromethylene chloride | $C Cl_2 N_2 O_4$. | 1.685. 15.° | 100°+. | |
| [10] Dichloro nitrophenol. | $C_6 H_3 Cl_2 N O_3$. | 1.59. | | 121°–122.° |
| [11] Dichloro-mono-nitrin. | $C_3 H_5 Cl_2 N O_3$. | 1.465, 10.° | 180°–190.° | |
| [12] Monochloro-di-nitrin. | $C_3 H_5 Cl N_2 O_6$. | 1.5112, 9.° | | |
| [13] Nitro-chloro-benzol. *a.* | $C_6 H_4 Cl N O_2$. | 1.380, 22.° | 242.° | 83.° |
| [14] " " " *a.* | " | 1.377, 0.° | 245.° | s. 15.° |
| [15] " " " *a.* | " | | | 82.° |
| [16] " " " *β.* | " | 1.358, 0.° | 232.° | s.–5.° |
| [17] " " " *β.* | " | 1.368, 22.° | 243.° | 15.° |
| [18] Dinitro-chloro-benzol. *a.* | $C_6 H_3 Cl N_2 O_4$. | 1.697, 22.° | 315.° | 50.° |
| [19] " " " *β.* | " | 1.6867, 16°5. | 315.° | 43.° |
| [20] " " " | " | 1.72, 18.° | | 50.° |
| [21] Nitro-dichloro-benzol. | $C_6 H_3 Cl_2 N O_2$. | 1.669, 22.° | 266.° | 54°5. |
| [22] Nitro-trichloro-benzol. | $C_6 H_2 Cl_3 N O_2$. | 1.790, 22.° | 288.° | 57.° |
| [23] Dinitro-dichloro-benzol. | $C_6 H_2 Cl_2 N_2 O_4$. | 1.7103, 16.° | 312°, p. d. | 87.° |
| [24] " " " | " | | | 101°–104.° |
| [25] Dinitro-trichloro-benzol. | $C_6 H Cl_3 N_2 O_4$. | 1.850, 25.° | 335°, p. d. | 103°5. |
| [26] Nitro-tetrachloro-benzol. | $C_6 H Cl_4 N O_2$. | 1.744, 25.° | 304°, p. d. | 99,° |
| [27] Nitro-pentachloro-benzol. | $C_6 Cl_5 N O_2$. | 1.718, 25.° | 328°, p. d. | 146.° |
| [28] Nitro-chloro-toluol. *a.* | $C_7 H_6 Cl N O_2$. | 1.307, 18.° | 243.° | |
| [29] " " " *β.* | " | 1.3259, 18.° | 253.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Nitro-dichloro-toluol. | $C_7 H_5 Cl_2 N O_2$. | 1.455, 17.° | 274.° | |
| [2] Chlorazol. | $C_4 H_3 Cl_3 N_2 O_4$. | 1.555. | | |
| [3] Derivative of protein. | $C_{12} H_{12} Cl_3 N O_4$. | 1.360. | | |
| [4] " " " | $C_2 H_2 Cl_3 N O_2$. | 1.628. | | |
| [5] Bichloramyl nitrite. | $C_5 H_9 Cl_2 N O_2$. | 1.233, 12.° | 90,° d. | |
| [6] Cinchonia hydrochiorate. | $C_{20} H_{24} N_2 O . H Cl$. | 1.234. | | |

## XLVII. Compounds Containing C. H. and Br.

### 1st. BROMIDES OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [7] Methyl bromide. | $C H_3 Br$. | 1.66443. 0.° | 13.° | |
| [8] Ethyl " | $C_2 H_5 Br$. | 1.40. | | |
| [9] " " | " | 1.47329, 0.° | 40°7. | |
| [10] " " | " | | 41.° | |
| [11] " " | " | | 38°57. | |
| [12] " " | " | 1.4600, 20.° | 40°2. | |
| [13] " " | " | 1.4621, 9.° | | |
| [14] " " | " | 1.4685, 13°5. | 38°78. | |
| [15] Propyl " | $C_3 H_7 Br$. | 1.353, 16.° | 70°5. | |
| [16] " " | " | | 68°–72.° | |
| [17] " " | " | 1.388, 0.° | 71.° | |
| [18] " " | " | 1.3497, 0.° | | |
| [19] " " | " | 1.301, 30°15. | 72.° | |
| [20] " " | " | 1.2589, 54°2. | | |
| [21] " " | " | 1.3577, 16.° | 70°82. | |
| [22] " " iso: | " | 1.320, 13.° | 60°–63.° | |
| [23] " " " | " | 1.33, 21.° | 60°–62.° | |
| [24] " " " | " | 1.248, 20.° | 61°–63.° | |
| [25] Butyl " | $C_4 H_9 Br$. | 1.274, 16.° | 89.° | |
| [26] " " | " | 1.305, 0.° | | |
| [27] " " | " | 1.2792, 20.° | 100°4. | |
| [28] " " | " | 1.2571, 40.° | 744 m. m. | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Butyl bromide. | $C_4 H_9 Br.$ | 1.2702, 16.° | 92.° | |
| [2] | " " | " | 1.249, 0.° | | |
| [3] | " " | " | 1.191, 40°2. | 90°5. | |
| [4] | " " | " | 1.1408, 73°5. | 760 m. m. | |
| [5] | Amyl " | $C_5 H_{11} Br.$ | 1.16576, 0.° | 118°7. | |
| [6] | " " | " | 1.217, 16.° | 121.° | |
| [7] | " " | " | 1.2045, 20.° | 118°8. | |
| [8] | " " | " | 1.246, 0.° | | |
| [9] | " " | " | 1.2234, 20.° | 128°7. | |
| [10] | " " | " | 1.2044, 40.° | 739. 4 m. m. | |
| [11] | Octyl " | $C_8 H_{17} Br.$ | | 190.° | |
| [12] | " " | " | 1.116, 16.° | 198°–200.° | |
| [13] | Cetyl " | $C_{16} H_{33} Br.$ | | | 15.° |

## 2d. BROMIDES OF THE ETHYLENE SERIES.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [14] | Ethylene bromide. | $C_2 H_4 Br_2.$ | 2.164, 21.° | 129°5. | s.-12° to-15° |
| [15] | " " | " | 2.128, 13.° | 130.° | |
| [16] | " " | " | 2.16292, 20°09. | 132°6. | |
| [17] | " " | " | | 130.° | s. 0.° |
| [18] | " " | " | | 132°5. | |
| [19] | " " | " | 2.179. | 131°–132.° | |
| [20] | " " | " | 2.1827, 20.° | 131°6. | |
| [21] | " " | " | | 131°6. | s. 9°53. |
| [22] | " " | " | 2.198, 10.° | | |
| | [Compare with brominated ethyl bromide.] | | | | |
| [23] | Trimethylene bromide. | $C_3 H_6 Br_2.$ | 2.0177, 0.° | 160°–163.° | |
| [24] | Propylene " | $C_3 H_6 Br_2.$ | 1.7. | 143.° | |
| [25] | " " | " | 1.974. | 145.° | |
| [26] | " " | " | | 143°–145.° | |
| [27] | " " | " | | 140°–144.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Propylene bromide. | $C_3 H_6 Br_2$. | 1.955, 9.° | | |
| [2] | " " | " | 1.954, 15.° | 140°–143.°) | |
| [3] | " " | " | 1.950, 16.° | 140°–142.°) | |
| [4] | " " | " | 1.943, 17.° | 140°5. | |
| [5] | " " | " | 1.972, 0.° | 142°65. | |
| [6] | " " | " | 1.946, 17.° | | |
| [7] | " " | " | 1.9586, 0.° | 141°–143.° | |
| [8] | " " | " | 1.9256, 20.° | | |
| [9] | " " | " | 1.9710, 0.° | 140°–141.° | |
| [10] | " " | " | 1.9383, 20.° | | |
| [11] | " " | " | 1.9463, 17.° | 141°61. | |
| | [Compare with brominated propyl bromide, and methyl bromacetol.] | | | | |
| [12] | Butylene bromide. | $C_4 H_8 Br_2$. | | 160.° | |
| [13] | " " | " | | 158.° | |
| [14] | " " | " | 1.8299, 0.° | 156°–159.° | |
| [15] | " " | " | 1.8119, | | |
| [16] | " " | " | 1.876, 0.° | 165°5–166.° | |
| [17] | Hexylene " | $C_6 H_{12} Br_2$. | 1.582, 19.° | 192°–198.° | |

## 3d. MISCELLANEOUS.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [18] | Bromoform. | C H $Br_3$. | 2.13. | | |
| [19] | " | " | 2.9, 12.° | 152.° | |
| [20] | Brominated ethyl bromide. | $C_2 H_4 Br_2$. | | 110.° | |
| [21] | " " " | " | 2.135, 0.° | 110°–112.° | |
| [22] | " " " | " | 2.132. | 110°–112.° | |
| [23] | " " " | " | 2.129. 10.° | | |
| [24] | Dibrominated " " | $C_2 H_3 Br_3$. | 2.620, 23.° | 186°5. | |
| [25] | " " " | " | 2.663, 0.° | 186.° | |
| [26] | " " " | " | 2.659, 0.° | 187.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Mono-brom-ethylene. | $C_2 H_3 Br$. | a. 1.52. | | |
| [2] Di-brom-ethylene. | $C_2 H_2 Br_2$. | 3.038, 10.° | | |
| [3] " " " | " | 3.053, 14°5. | | |
| [4] Dibromethylene dibromide. | $C_2 H_2 Br_4$. | 2.88, 22.° | | |
| [5] Brominated propyl bromide. | $C_3 H_6 Br_2$. | 1.9469, 15.° | 141°–142.° | |
| [6] Brom propylene hydrobromate. | $C_3 H_6 Br_2$. | 1.895, 9.° | 122.° | |
| [7] Mono-bromo-propylene. | $C_3 H_5 Br$. | 1.400, 13.° | 56°–59.° | |
| [8] " " " | " | 1.410, 14.° | 56°–58.° | |
| [9] " " " | " | 1.408, 19.° | 56°5. | |
| [10] " " " | " | 1.4110, 15.° | 57°60.° | |
| [Compare with allyl bromide.] | | | | |
| [11] Di-bromo-propylene. | $C_3 H_4 Br_2$. | 1.98, 15.° | 127°–131.° | |
| [12] Brominated propylene bromide. | $C_3 H_5 Br_3$. | 2.336. | 192.° | |
| [13] " " " | " | 2.392, 23.° | 195.° | |
| [14] " " " | " | 2.39, 10.° | 194°–196.° | |
| [15] Dibrominated " " | $C_3 H_4 Br_4$. | 2.469. | 226.° | |
| [16] Tribrominated, " " | $C_3 H_3 Br_5$. | 2.601. | 255.° | |
| [17] Mono-bromo-butylene. | $C_4 H_7 Br$. | | 82°–92.° | |
| [18] Di-bromo-butylene. | $C_4 H_6 Br_2$. | | 140°–150.° | |
| [19] Brominated butylene bromide. | $C_4 H_7 Br_3$. | | 208°–215.° | |
| [20] Mono-bromo-amylene. | $C_5 H_9 Br$. | 1.22, 19.° | 117°–118.° | |
| [21] Mono-bromo-hexylene. | $C_6 H_{11} Br$. | 1.17, 15.° | 138.° | |
| [22] Mono-bromo-decylene. | $C_{10} H_{19} Br$. | 1.109, 15.° | 215.° | |
| [23] _____ ? | C H $Br_2$. | 2.55. | 118.° p. d. | |
| [24] Methyl bromacetol. | $C_3 H_6 Br_2$. | 1.39. (Impure.) | 115°–118.° | |
| [25] " | " | 1.8149, 0.° | 113°–116.° | |
| [26] " | " | 1.7825, 20.° | | |
| [27] Allyl bromide. | $C_3 H_5 Br$. | 1.472. | 62.° | |
| [28] " " | " | 1.451, 0.° | | |
| [29] " " | " | 1.4385, 15.° | 70.° 753 m. m. | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Allyl bromide. | $C_3 H_5 Br$. | 1.3609, 62.° | | |
| [2] | " " | " | 1. 4507, 0.° | 70.° | |
| [3] | " " | " | | 70.° | |
| [4] | " " | " | | 70°–71.° | |
| [5] | " " | " | 1.461, 0.° | 70°–71.° | |
| [6] | " " | " | 1.436, 15.° | | |
| [7] | Allyl tribromide. | $C_3 H_5 Br_3$. | 2.436, 23.° | 217°–218.° | 16.° |
| [8] | " " | " | 2.966, 0.° | a. 240.° | |
| [9] | " " | " | | 216°–220.° | |
| [10] | Allylene bromide. | $C_3 H_4 Br_2$. | 1.950. | 120.° | |
| [11] | " " | " | 2.05, 0.° | 126°–138.° | |
| [12] | " " | " | 2.00, 15.° | 130°–131.° | |
| [13] | " tetrabromide. | $C_3 H_4 Br_4$. | 2.94, 0.° | 225°–230.° | |
| [14] | Tribromhydrine. | $C_3 H_5 Br_3$. | 2.407, 10.° | 219°–220.° | 16°–17.° |
| [15] | Epidibromhydrine. | $C_3 H_4 Br_2$. | 2.06, 11.° | 151°–152.° | |
| [16] | Epidibromhydrine bromide. | $C_3 H_4 Br_4$. | 2.64. | 250°–252.° | |
| [17] | Conylene bromide. | $C_8 H_{14} Br_2$. | 1.5679, 16°25. | | |
| [18] | Dibromo-benzol. | $C_6 H_4 Br_2$. | | | 89.° |
| [19] | Tetrabromo-benzol. | $C_6 H_2 Br_4$. | | | 137°–140.° |
| [20] | Benzyl bromide. | $C_7 H_7 Br$. | 1.438, 22.° | 201°5–202°5. | |
| [21] | Mono-bromo-toluol. | $C_7 H_7 Br$. | 1.4092, 21°5. | 179.° | |
| [22] | " " | " | 1.4109, 22.° | 185°–185.°5. | |
| [23] | " " | " | 1.4009, 21.° | 181°–182.° | |
| [24] | " " | " | | 181.° | 28°5. |
| [25] | " " | " | 1.3999, 30.° | 185.° | 28°–29.° |
| [26] | Dibromo " | $C_7 H_6 Br_2$. | 1.8127, 19.° | 236.° | |
| [27] | " " | " | 1.812, 19.° | 238°–239.° | |
| [28] | " " | " | | 239.° | 42.° 5. |
| [29] | " " | " | | 241.° | 60.° |
| [30] | " " | " | 1.812, 22.° | 246.° | |
| [31] | Mono-bromo-xylol. | $C_8 H_9 Br$. | 1.335, 21.° | 212.° | |
| [32] | " " | " | | 203°–204.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Mono-bromo-xylol. | $C_8 H_9 Br$. | | 207°5. | |
| [2] Bromo-ethyl benzol. | $C_8 H_9 Br$. | 1.34, 13°5. | 199.° | |
| [3] Mono-bromo-cumol. | $C_9 H_{11} Br$. | 1.3223, 13.° | 218°–220.° | |
| [4] Mono-bromo-dibenzyl. | $C_{14} H_{13} Br$. | 1.318, 9.° | 320°+. | s. 0°—. |
| [5] Bromo-mesitylene. | $C_9 H_{11} Br$. | 1.3191, 10.° | 225.° | |
| [6] Mono-bromo-naphthaline | $C_{10} H_7 Br$. | 1.555. | 285.° | |
| [7] " " " | " | 1.503, 12.° | 277.° | |

## XLVIII. Compounds Containing C. H. Br. O., C. Br. N. O., and C. H. N. Br.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [8] Acetyl bromide. | $C_2 H_3 O Br$. | | 81.° | |
| [9] Propionyl " | $C_3 H_5 O Br$. | 1,465, 14.° | 96°–98.° | |
| [10] Monobromacetyl bromide | $C_2 H_2 O Br_2$. | 2.317, 21°5. | 149°–150.° | |
| [11] Monobromacetic acid. | $C_2 H_3 Br O_2$. | | 208.° | Below 100° |
| [12] Dibromacetic " | $C_2 H_2 Br_2 O_2$. | 2.25. | 225°–230.° | |
| [13] " " | " | | 232°–234.° | |
| [14] Tribromacetic " | $C_2 H Br_3 O_2$. | | 245.° | 130.° |
| [15] Monobromopropionic acid. | $C_3 H_5 Br O_2$. | | 190°–210.° | |
| [16] Dibromopropionic " | $C_3 H_4 Br_2 O_2$. | | 227.° | 65.° |
| [17] Monobromobutyric " | $C_4 H_7 Br O_2$. | 1.54, 15.° | 180.° | |
| [18] Dibromobutyric " | $C_4 H_6 Br_2 O_2$ | 1.97. | | |
| [19] " " | " | | 230.° p. d. | 45°–48.° |
| [20] Monobromostearic " | $C_{18} H_{33} Br O_2$. | 1.0653, 20.° | | 41.° |
| [21] Bromopropionic ether. | $C_5 H_9 Br O_2$. | 1.396, 11.° | 159°–160.° | |
| [22] Bromobutyric " | $C_6 H_{11} Br O_2$. | 1.33, 15.° | 185.° p. d. | |
| [23] " " | " | 1.345, 12.° | 175°–178.° | |
| [24] Deriv. of monobromamylene. | $C_7 H_{13} Br O$. | 1.23, 19.° | 177°–180.° | |
| [25] Bromal. | $C_2 H Br_3 O$. | 3.34. | 100°+. | |
| [26] " | " | | 172°–173.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Parabromalide. | $C_2 H Br_3 O$. | 3.107. | 200°, p. d. | 67.° |
| [2] Deriv. of Oleic acid. | $C_{18} H_{32} Br_2 O_2$. | 1.272, 7°5. | 200.° | |
| [3] Epibromhydrin. | $C_3 H_5 Br O$. | 1.615, 14.° | 138.° | |
| [4] Dibromhydrin. | $C_3 H_6 Br_2 O$. | 2.11, 10.° | 219.° | |
| [5] " | " | 2.11, 18.° | 219.° | |
| [6] Bromophenylic acid. | $C_6 H_5 Br O$. | 1.6606, 30.° | 132° 22 m. m. | |
| [7] Bromo isopropyl phenate. | $C_9 H_{11} Br O$. | 1.981, 0.° | 236.° | |
| [8] " " " | " | 1.957, 12°5. | 760 m. m. | |
| [9] Bromo methyl phenol. | $C_7 H_7 Br O$. | 1.494, 9.° | 210.° | |
| [10] Bromopicrin. | $C Br_3 N O_2$. | 2.811, 12°5. | | 10°25. |
| [11] Liquid nitrobromtoluol. | $C_7 H_5 Br N O_2$. | 1.612, 20.° | 269.° | s.—20.° |
| [12] " " β. | " | 1.631, 18.° | 255°–256.° | |
| [13] Solid " α. | " | | 256°–257.° | 43.° |

## XLIX. Compounds Containing both Chlorine and Bromine.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [14] Ethylene bromochloride. | $C_2 H_4 Cl Br$. | 1.700, 18.° | 107°–108.° | |
| [15] Bromethylene hydrochlorate. | $C_2 H_4 Cl Br$. | 1.61, 14.° | 81°–82.° | |
| [16] Propylene bromochloride. | $C_3 H_6 Cl Br$. | 1.62, 16.° | 112°–113.° | |
| [17] Hexchloro propylene bromide. | $C_3 Cl_6 Br_2$. | 1.974. | | |
| [18] Chloro-acetyl-bromide. | $C_2 H_2 O Cl Br$. | 1.913, 9.° | 127.° | |
| [19] Bromo-acetyl-chloride. | " | 1.908, 9.° | 127.° | |
| [20] Perchlorobromethylic ether. | $C_4 Cl_6 Br_4 O$. | 2.5, 18.° | | 96.° |
| [21] Chlorobromhydrin. | $C_3 H_6 Cl Br O$. | 1.740, 12.° | 197.° | |
| [22] " | " | 1.7641, 9.° | 185°–197.° | |
| [23] Chlorodibromhydrin. | $C_3 H_5 Cl Br_2$. | 2.085, 9.° | 202°–203.° | |
| [24] " | " | 2.088. | 195.° | |
| [25] " | " | 2.004, 15.° | 195°–200.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Derivative of acetone. | $C_3 H_5 Cl Br_2$. | 2.064, 0.° | 170.° | |
| [2] Epichlorobromhydrin. | $C_3 H_4 Cl Br$. | 1.69, 14.° | 126°–127.° | |
| [3] Epichlorobromhydrin + Br. | $C_3 H_4 Cl Br_3$. | 2.39, 14.° | 238.° | |
| [4] Epidichlorhydrin + Br. | $C_3 H_4 Cl_2 Br_2$. | 2.10, 13.° | 220°–221.° | |
| [5] Bromodichlorhydrin of phycite. | $C_3 H_5 Cl_2 Br O$. | 2.1719, 0.° | | |
| " " | " | 2.1426, 17°5. | | |

## L. Compounds Containing C. H. and I.

### 1st. IODIDES OF THE ETHYL SERIES.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [7] Methyl iodide. | $C H_3 I$. | 2.237, 22.° | 40°–50.° | |
| [8] " " | " | 2.19922, 0.° | 43°8. | |
| [9] " " | " | | 42°2. | |
| [10] " " | " | 2.2636, 20.° | 43°7. | |
| [11] " " | " | 2.269, 25.° | 42°5. | |
| [12] Ethyl " | $C_2 H_5 I$. | 1.9206, 23°3. | 64°8. | |
| [13] " " | " | 1.92, 16.° | 64°5. | |
| [14] " " | " | 1.97546, 0.° | 70.° | |
| [15] " " | " | | 71°3. | |
| [16] " " | " | 1.9464, 16.° | 71°6–72°2. | |
| [17] " " | " | 1.9309, 15.° | | |
| [18] " " | " | 1.98, 4.° | 72°–73.° | |
| [19] " " | " | 1.927, 20.° | 71.° | |
| [20] " " | " | 1.9265, 19.° | 72°27. | |
| [21] " " | " | 1.935, 20.° | 73.° | |
| [22] " " | " | 1.938, 20.° | 72°2. | |
| [23] " " | " | 1.979, 0.° | | |
| [24] " " | " | 1.907, 30°4. | | |
| [25] " " | " | 1,9444, 14°5. | 72°30. | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Propyl iodide. | $C_3 H_7 I.$ | 1.789, 16.° | 101.° | |
| [2] | " " | " | | 99°–101.° | |
| [3] | " " | " | 1.7012, 21.° | 101°5. | |
| [4] | " " | " | 1.7343, 16.° | 102°–103.° | |
| [5] | " " | " | 1.782, 0.° | 102.° | |
| [6] | " " | " | 1.7472. 16.° | 102°25. | |
| [7] | " " | " | 1.7377, 23.° | 102°11. | |
| [8] | " " | " | 1.7610, 16.° | 102°20. | |
| [9] | " " iso. | " | | 90°–95.° | |
| [10] | " " " | " | 1.70, 15.° | 89°–90.° | |
| [11] | " " " | " | 1.714, 16.° | 89.° | |
| [12] | " " " | " | 1.73, 0.° | 92°–94.° | |
| [13] | " " " | " | 1.725, 0.° | 93.° | |
| [14] | " " " | " | 1.69, 15.° | 89°–90.° | |
| [15] | " " " | " | 1.71, 15.° | 89°–90.° | |
| [16] | " " " | " | 1.735, 0.° | 89.° | |
| [17] | " " " | " | 1.711, 17.° | | |
| [18] | " " " | " | 1.71732, 17,° m. of 4. | 93.° | |
| [19] | " " " | " | 1.562442,93,°m. of 4. | | |
| [20] | " " " | " | 1.70, 18.° | 88°–89.° | |
| [21] | " " " | " | 1.715, 15°5. | 89°–90.° | |
| [22] | " " " | " | 1.7109, 15.° | 88°7–89°5. | |
| [23] | " " | " | 1.7842, 0.° | | |
| [24] | " " | " | 1.7674, 9°1. | 104°25–104°5. | |
| [25] | " " | " | 1.6843, 52°6. | | |
| [26] | " " | " | 1.6373, 75°3. | | |
| [27] | Butyl " | $C_4 H_9 I.$ | 1.604, 19.° | 121.° | |
| [28] | " " | " | 1.632, 0.° | | |
| [29] | " " | " | 1.600, 20.° | 118.° | |
| [30] | " " | " | 1.584, 30.° | | |
| [31] | " " | " | 1.643, 0.° | 116°–118.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Butyl iodide. | $C_4 H_9 I$. | 1.6301, 0.° | 121.° | |
| 2 | " " | " | 1.6032, 16.° | | |
| 3 | " " | " | 1.54816, 50.° | | |
| 4 | " " | " | 1.6263, 0.° | 119°–120.° | |
| 5 | " " | " | 1.6111, 10.° | | |
| 6 | " " | " | 1.5952, 20.° | 758.3 m. m. | |
| 7 | " " | " | 1.5787, 30.° | | |
| 8 | " " | " | | 130.° | |
| 9 | " " | " | 1.643, 0.° | 129°6. | |
| 10 | " " | " | 1.6136, 20.° | | |
| 11 | " " | " | 1.5894, 40.° | 738.2 m. m. | |
| 12 | " " | " | 1.6345, 0.° | 122°5. | |
| 13 | " " | " | 1.6214, 8°3. | | |
| 14 | " " | " | 1.6387, 56°4. | | |
| 15 | " " | " | 1.464, 98°8. | | |
| 16 | " " | " | 1.6081, 19°5. | 120°57, | |
| 17 | " " | " | | 120°63. | |
| [18] | Amyl " | $C_5 H_{11} I$. | 1.51113, 11°5. | 146.° | |
| 19 | " " | " | 1.5277, 0.° | | |
| 20 | " " | " | 1.4936, 20.° | 149.° | |
| 21 | " " | " | 1.4676, 0.° | 147°2–147°7 | |
| 22 | " " | " | 1.4387, 22°3. | | |
| 23 | " " | " | 1.5087, 15°8. | | |
| 24 | " " | " | 1.4734, 20.° | 147.° | |
| 25 | " " | " | 1.5435, 0.° | 155°4. | |
| 26 | " " | " | 1.5174, 20.° | | |
| 27 | " " | " | 1.4961, 40.° | 739.3 m. m. | |
| [28] | Hexyl " | $C_6 H_{13} I$. | 1.439. | 165.° | |
| 29 | " " | " | 1.431, 19.° | 172°–175.° | |
| 30 | " " $\beta$. | " | 1.4447, 0.° | 167°5. | |
| 31 | " " " | " | 1.3812, 50.° | 752 m. m | |

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31 Wanklyn & Erlenmeyer.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Hexyl iodide. | $C_6 H_{13} I.$ | 1.4115. | 179°5. | |
| [2] Heptyl " | $C_7 H_{15} I.$ | | 196.° | |
| [3] " " | " | | 190.° | |
| [4] " " | " | | 192.° | |
| [5] Octyl " | $C_8 H_{17} I.$ | | 193.° | |
| [6] " " | " | 1.310, 16.° | 210.° | |
| [7] " " | " | 1.338. 16.° | 220°–222.° | |
| [8] " " iso. | " | 1.330, 0.° | 120,° | |
| [9] " " " | " | 1.314, 21.° | in vacuo. | |
| [10] Cetyl " | $C_{16} H_{33} I.$ | | | 22.° |
| [11] Melissyl " | $C_{30} H_{61} I.$ | | | 67.° |

## 2d. MISCELLANEOUS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [12] Methylene iodide. | $C H_2 I_2.$ | 3.342, 5.° | 181,° p. d. | 5,° rs. 3.° |
| [13] Ethylene " | $C_2 H_4 I_2.$ | | | 73.° |
| [14] " " | " | 2.07. | | 70.° |
| [15] Propylene " | $C_3 H_6 I_2.$ | 2.490, 18°5. | | |
| [16] Allyl " | $C_3 H_5 I.$ | 1.789, 16.° | 101.° | |
| [17] " " | " | 1.746, 0.° | 89°–92.° | |
| [18] " " | " | 1.848, 12.° | 101°5–102.° | |
| [19] " " | " | 1.839, 14.° | 101°–102.° | |
| [20] " " | " | | 97°–100.° | |
| [21] Allylene " | $C_3 H_4 I_2.$ | 2.62, 0.° | 198.° | |
| [22] Moniodo-allylene. | $C_3 H_3 I.$ | 1.7. | 98.° | |
| [23] Diallyl monohydriodate. | $C_6 H_{11} I.$ | 1.497, 0.° | 164°–165.° | |
| [24] " dihydriodate. | $C_6 H_{12} I_2.$ | 2.024, 0.° | | |
| [25] Allylene monohydriodate. | $C_3 H_5 I.$ | 1.8346, 0.° | 82.° | |
| [26] " " | " | 1.8028, 16.° | | |
| [27] " dihydriodate. | $C_3 H_6 I_2.$ | 2.15, 0.° | | |

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[23] Wurtz. 17. 514.
[24] Wurtz. 17. 511.
[25] Semenoff. 18. 494.
[26] Compare with allyl iodide.
[27] Oppenheim. 18. 493.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Allylene dihydriodate. | $C_3 H_6 I_2$. | 2.4458, 0.° | 147°–148.° | |
| [2] Ethyl vinyl hydriodate. | $C_4 H_9 I$. | 1.634, 0.° | 120°–121.° | |
| [3] Ethyl allyl " | $C_5 H_{11} I$. | 1.537, 0.° | 146.° | |
| [4] " " " | " | 1.5219, 11.° | 763 m. m. | |
| [5] Vinyl iodide. | $C_2 H_3 I$. | 1.98.° | | |
| [6] Iodoform. | $C H I_3$. | 2.00. | | 115°–120.° |
| [7] Moniodobenzol. | $C_6 H_5 I$. | 1.69. | 185°–190. | |
| [8] " | " | 1.833. | 188°2. | |
| [9] " | " | 1.64, 15.° | 185.° | |
| [10] Iodotoluol. Ortho. | $C_7 H_7 I$. | 1.698, 20.° | 204.° | |
| [11] " Meta. | " | 1.697, 20.° | 205.° | |
| [12] Benzyl iodide. | $C_7 H_7 I$. | 1.7335, 25.° l. | a. 240.° | 24°1. |

## LI. Compounds Containing C, H, O, and I.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Acetyl iodide. | $C_2 H_3 O. I$. | 1.98, 17.° | 108.° | |
| [14] " " | " | | 104°–105.° | |
| [15] Propionyl iodide. | $C_3 H_5 O. I$. | | 127°–128.° | |
| [16] Butyryl " | $C_4 H_7 O. I$. | | 146°–148.° | |
| [17] Valeryl " | $C_5 H_9 O. I$. | | 168.° | |
| [18] Biniodated methyl oxide | $C_2 H_2 I_4 O$. | 3.345. | 181°–182.° | s.—6.° |
| [19] Iodhydrin. | $C_6 H_{11} I O_3$. | 1.783. | | |
| [20] Epi iodhydrin. | $C_3 H_5 I O$. | 2.03, 13.° | 160°–180.° | |

## LII. Compounds Containing both Chlorine and Iodine, or Bromine and Iodine.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [21] Ethylene chloriodide. | $C_2 H_4 Cl I$. | 2.151, 0.° | 145.° | |
| [22] " " | " | 2.39, 20.° | 146.° | |
| [23] Propylene " | $C_3 H_6 Cl I$. | 1.932, 0.° | | |
| [24] " " | " | 1.824. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Chloriodoform. | C H $Cl_2$ I. | 1.96. | | |
| [2] « | « | 2.454, 0.° ) | | |
| [3] « | « | 2.403, 21°5.) | | |
| [4] Chloriodotoluol. | $C_7$ $H_6$ Cl I. | 1.702, 19.° | 240.° | |
| [5] « Alpha. | « | 1.716, 17.° | 242°–243.° | |
| [6] « Beta. | « | 1.770, 19°5. | 240.° | 10.° |
| [7] Iodochlorhydrin. | $C_6$ $H_6$ Cl I $O_2$. | 2.06, 10.° | 226.° | |
| [8] Ethylene bromiodide. | $C_2$ $H_4$ Br I. | 2.7, 1.° | 160,° p. d. | |
| [9] Bromethylene hydriodate | $C_2$ $H_4$ Br I. | 2.5, 1.° | 141°–142.° | |
| [10] Brompropylene « | $C_3$ $H_6$ Br I. | 2.2, 11.° | 148,° p. d. | |
| [11] Para-iodorthobromtoluol. | $C_7$ $H_6$ Br I. | 2.044, 20.7.° | 265.° | |
| [12] Meta-iodorthobromtoluol. | « | 2.139, 18.° | 260.° | |

## LIII. Organic Compounds Containing Sulphur.

### 1st. COMPOUNDS CONTAINING C, H, and S.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [13] Methyl sulphide. | $C_2$ $H_6$ S. | .845, 21.° | 41.° | |
| [14] Methyl ethyl sulphide. | $C_3$ $H_8$ S. | | 58°8–59°5. | |
| [15] Ethyl « | $C_4$ $H_{10}$ S. | .825, 20.° | 73.° | |
| [16] « « | « | .83672, 0.° | 91.° | |
| [17] « « | « | | 81.° | |
| [18] Isopropyl « | $C_6$ $H_{14}$ S. | | 105.° | |
| [19] Ethyl amyl « | $C_7$ $H_{16}$ S. | | 132°–133°5. | |
| [20] « « « | « | .852, 0.° | 158°–159.° | |
| [21] Butyl « | $C_8$ $H_{18}$ S. | .849. 0.° | 176 –185.° | |
| [22] Amyl « | $C_{10}$ $H_{22}$ S. | | 216.° | |
| [23] Hexyl « | $C_{12}$ $H_{26}$ S. | | 230.° | |
| [24] Cetyl « | $C_{32}$ $H_{66}$ S. | | | 57°5. s. 54.° |
| [25] Methyl disulphide. | $C_2$ $H_6$ $S_2$. | 1.046, 18.° | 116°–118.° | |
| [26] « « | « | 1.06358, 0.° | 112°1. | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ethyl disulphide. | $C_4 H_{10} S_2$. | about 1.00. | 151.° | |
| [2] Amyl " | $C_{10} H_{22} S_2$. | .918, 18.° | 240°–260.° | |
| [3] Amylene sulphide. | $C_5 H_{10} S$. | .907, 13.° | a. 200.° | |
| [4] Fusyl disulphide. | $C_5 H_9 S$. | .880, 13.° | | |
| [5] Allyl trisulphide. | $C_6 H_{10} S_3$. | 1.012, 15.° | 188.° | |
| [6] Methyl mercaptan. | $C H_3 . H . S$. | | 21.° | |
| [7] Ethyl " | $C_2 H_5 . H . S$. | .842, 15.° | 61°–63.° | |
| [8] " " | " | .835, 21.° | 36°2. | |
| [9] Propyl " iso. | $C_3 H_7 . H . S$. | | 45.° | |
| [10] Butyl " | $C_4 H_9 . H . S$. | .848, 11°5. | 88.° | |
| [11] Amyl " | $C_5 H_{11} . H . S$. | | 125.° | |
| [12] " " | " | .835, 21.° | 117.° | |
| [13] " " | " | .8548, 0.° } | 119°8. | |
| [14] " " | " | .8405, 16°9. } | | |
| [15] Hexyl " | $C_6 H_{13} . H . S$. | | 145°–148.° | |
| [16] " " β. | " | .8856, 0.° | 142.° | |
| [17] Heptyl " | $C_7 H_{15} . H . S$. | | 155°–158.° | |
| [18] Cetyl " | $C_{16} H_{33} . H . S$. | | | 50°5, s. 44.° |
| [19] Ethylene sulphydrate. | $C_2 H_6 S_2$. | 1.123, 23°5. | 146.° | |
| [20] Sulphydrate of acetyl mercaptan. | $C_{12} H_{26} S_7$. | 1.134. | 180.° | |
| [21] Methyl sulphocarbonate | $C_3 H_6 S_3$. | 1.159, 18. | 200°–205.° | |
| [22] Ethyl " | $C_5 H_{10} S_3$. | | 237°–240.° | |
| [23] " " | " | | 240.° | |
| [24] Amyl " | $C_{11} H_{22} S_3$. | .877. | 245°–248.° | |
| [25] Ethylene trisulphocarbonate. | $C_3 H_4 S_3$. | 1.4768. | | 36°5. |
| [26] Propylene " | $C_4 H_6 S_3$. | 1.31, 20.° | | |
| [27] Butylene " | $C_5 H_8 S_3$. | 1.26, 20.° | | |
| [28] Amylene " | $C_6 H_{10} S_3$. | 1.073. | | |
| [29] Allyl " | $C_7 H_{10} S_3$. | .943. | 170°–175.° | |
| [30] Phenyl sulphide. | $C_{12} H_{10} S$. | 1.119. | 292°5. | |
| [31] " sulphydrate. | $C_6 H_5 . H . S$. | 1.078, 14.° | 165.° | |
| [32] " " | " | | 172°5. | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Benzyl sulphydrate. | $C_7 H_7 . H . S$. | 1.058, 20.° | 194°–195.° | |
| [2] Naphtyl " | $C_{10} H_8 S$. | 1.146, 23.° | 285.° | |
| [3] Mesitylene " | $C_9 H_{12} S$. | 1.0192. | 228°–229.° | |
| [4] Sulphoxenol. | $C_8 H_{10} S$. | 1.036, 13,° | 213.° | |
| [5] Glycerin trisulphydrate. | $C_3 H_8 S_3$. | 1.391, 14°4. | | |

## 2d. COMPOUNDS CONTAINING C, H, S, and O.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [6] Methyl sulphite. | $C_2 H_6 S O_3$. | 1.0456, 16°2. | 121°5. | |
| [7] Methyl ethyl sulphite. | $C_3 H_8 S O_3$. | 1.0675, 18.° | 140°–141°5. | |
| [8] Ethyl " | $C_4 H_{10} S O_3$. | 1.085, 16.° | 150°–170° | |
| [9] " " | " | 1.10634, 0.° | 160°3. | |
| [10] " " | " | 1.1063, 0.° | 161°3. | |
| [11] " " | " | 1.0926, 12°7. | | |
| [12] Ethyl amyl " | $C_7 H_{16} S O_3$. | | 210°–225.° | |
| [13] Methyl sulphate. | $C_2 H_6 S O_4$. | 1.324, 22.° | 188.° | |
| [14] " " | " | 1.385, 13.° | | |
| [15] Ethyl " | $C_4 H_{10} S O_4$. | 1.120.° | | |
| [16] Ethyl sulphurous acid. | $C_2 H_6 S O_3$. | 1.3. | | |
| [17] " sulphuric " | $C_2 H_6 S O_4$. | 1.315–1.317, 16.° | | |
| [18] " ethylsulphonate. | $C_4 H_{10} S O_3$. | 1.1712, 0.° | 207°5. | |
| [19] " " | " | 1.1508, 20°4. | 746.9 m. m. | |
| [20] Methyl disulphocarbonate. | $C_3 H_6 S_2 O$. | 1.143, 15.° | 170°–172.° | |
| [21] Ethyl methyl " | $C_4 H_8 S_2 O$. | 1.123, 11.° | 179.° | |
| [22] Ethyl " | $C_5 H_{10} S_2 O$. | 1.0703, 18.° | 210 –212.° | |
| [23] " " | " | 1.07. | 200.° | |
| [24] Ethyl monosulphocarbonate. | $C_5 H_{10} S O_2$. | 1.032, 1.° | 162.° | |
| [25] Thiacetic acid. | $C_2 H_4 S O$. | 1.074, 10.° | 93.° | |
| [26] Disulphamylene oxide. | $C_{10} H_{20} S_2 O$. | 1.054, 13.° | | |
| [27] " hydrate. | $C_5 H_{12} S O$. | 1.049, 8.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Deriv. of œnanthol. | $C_{14} H_{28} S O$. | .875, 23.° | | |
| [2] Glycerin monosulphydrate. | $C_3 H_8 S O_2$. | 1.295, 14°4. | | |
| [3] " disulphydrate | $C_3 H_8 S_2 O$. | 1.342, 14°4. | | |
| [4] Xanthurin. | $C_4 H_8 S O_2$. | 1.012. | 145.° | |
| [5] Carbonyl disulpho diethyl. | $C_5 H_{10} S_2 O$. | 1.084, 20.° | 196°–197.° | |

## 3d. SULPHUR COMPOUNDS CONTAINING NITROGEN.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [6] Methyl sulphocyanide. | $C_2 H_3 N S$. | 1.115, 16.° | 132°–133.° | |
| [7] " " | " | 1.08794, 0.° | 132°86. | |
| [8] Ethyl " | $C_3 H_5 N S$. | 1.020, 16.° | 146.° | |
| [9] " " | " | a. 1.00, 15.° | | |
| [10] " " | " | 1.033, 0.° | | |
| [11] " " | " | 1.0126, 19.° | | |
| [12] " " | " | 1.0024, 23.° | 146.° | |
| [13] " " | " | .8694. } 146.° | | |
| [14] " " | " | .87014. } | | |
| [15] Isopropyl " | $C_4 H_7 N S$. | .963, 20.° | 149°–151.° | |
| [16] Amyl " | $C_6 H_{11} N S$. | | 197.° | |
| [17] " " | " | .905, 20.° | 195°–210.° | |
| [18] Hexyl " | $C_7 H_{13} N S$. | .922, 12.° | 215°–220.° | |
| [19] Allyl " | $C_4 H_5 N S$. | 1.015, 20.° | 143.° | |
| [20] " " | " | 1.009, } 15.° | 148.° | |
| [21] " " | " | 1.010, } | | |
| [22] " " | " | 1.0282, 0.° } | 150°4–150°7 | |
| [23] " " | " | 1.0173, 10°1. } | | |
| [24] Phenyl " | $C_7 H_5 N S$. | 1.135, 15°5. | 222.° | |
| [25] Amylene bithiocyanide. | $C_5 H_{10} S Cy$. | 1.07, 13.° | | |
| [26] Amylene bithio bithiocyanide. | $C_5 H_{10} S_2 Cy$. | 1.16, 13.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sulphocyanacetic ether. | $C_5 H_7 N S O_2$. | 1.174. | a. 220° p.d. | |
| [2] Thialdine. | $C_6 H_{13} N S_2$. | 1.191, 18.° | | 43,° s. 42.° |
| [3] Œnanthothialdine. | $C_{21} H_{43} N S_2$. | .896, 24.° | | |
| [4] Cystic oxide. | $C_3 H_7 N S O_2$. | 1.7143. | | |

## 4th. CHLORINATED SULPHUR COMPOUNDS.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [5] Chlorosulphuric ether. | $C_2 H_5 Cl S O_3$. | 1.379, 0.° | | |
| [6] « « | « | 1.3556, 27.° | 80°–82.° | |
| [7] « « | « | 1.324, 61.° | | |
| [8] Tetrachlorethylic sulphide. | $C_4 H_6 Cl_4 S$. | 1.547, 12.° | 167°–172.° | |
| [9] Octochlorethylic « | $C_4 H_2 Cl_8 S$. | 1.673, 24.° | 160.° p. d. | |
| [10] Trichlormethylamyl sulphite. | $C_6 H_{11} Cl_3 S O_3$. | 1.104. | | |
| [11] Ethylene bisulphochloride. | $C_2 H_4 S Cl$. | 1.346, 19.° | | |
| [12] Amylene « | $C_5 H_{10} S Cl$. | 1.149, 12.° | | |
| [13] Chlorethylene « | $C_2 H_3 S Cl_2$. | 1.599, 11.° | | |
| [14] Ethylene bichlorosulphide. | $C_2 H_4 S Cl_2$. | 1.408, 13.° | | |
| [15] Amylene « | $C_5 H_{10} S Cl_2$. | 1.138, 14.° | | |
| [16] Bichlorethylene chlorosulphide. | $C_4 H_4 S Cl_6$. | 1.225, 13°5. | | |
| [17] « « | « | 1.219, 13°5. | | |
| [18] Terchloramylene « | $C_{10} H_{14} S Cl_8$. | 1.406, 16.° | | |
| [19] Ethyl sulphurous chloride. | $C_2 H_5 Cl S O_2$. | 1.357, 22°5. | 171.° | |
| [20] Phenyl « « | $C_6 H_5 Cl S O_2$. | 1.378, 23.° | 254.° | |

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## LIV. Organic Compounds of Selenium and Tellurium.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ethyl selenide. | $C_4 H_{10} Se$. | | 107°–108.° | |
| [2] " diselenide. | $C_4 H_{10} Se_2$. | | 186.° | |
| [3] Methyl telluride. | $C_2 H_6 Te$. | | 82.° | |
| [4] Ethyl " | $C_4 H_{10} Te$. | | Below 100.° | |
| [5] Amyl " | $C_{10} H_{22} Te$. | | 198.° | |
| [6] Tellurmethyl chloride. | $C_2 H_6 Te. Cl_2$. | | | 97°5. |
| [7] " bromide. | $C_2 H_6 Te. Br_2$. | | | 89.° |

## LV. Organic Compounds Containing Phosphorus.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [8] Ethyl phosphite. | $C_6 H_{15} P O_3$. | 1.075. | 191.° | |
| [9] Amyl " | $C_{15} H_{33} P O_3$. | | 236.° | |
| [10] Ethyl phosphate. | $C_6 H_{15} P O_4$. | 1.072, 12.° | 215.° | |
| [11] " pyrophosphate. | $C_8 H_{20} P_2 O_7$. | 1.172, 17.° | | |
| [12] Amyl amylphosphite. | $C_{10} H_{23} P O_3$. | .967, 19°5. | | |
| [13] Diamyl phosphoric acid. | $C_{10} H_{23} P O_4$. | 1.025, 20.° | | |
| [14] Amylnitrophosphorous acid. | $C_{10} H_{23} P N O_4$. | 1.02, 20.° | | |
| [15] " " " | " | 1.00, 70. | | |
| [16] Amylsulphoxyphosphoric ether. | $C_{15} H_{33} P S O_3$. | .849, 12.° | | |
| [17] Triphenyl trisulphophosphamide. | $C_{18} H_{18} N_3 P S$. | 1.34. | | 78.° |
| [18] Ethyl phosphite chloride | $C_2 H_5 P O Cl_2$. | 1.316, 0.° | 117.° | |
| [19] Butyl " " | $C_4 H_9 P O Cl_2$. | 1.191, 0.° | 154°–156.° | |
| [20] Amyl " " | $C_5 H_{11} P O Cl_2$. | 1.109, 0.° | 173.° | |
| [21] Monomethyl phosphin. | $C H_5 P$. | | —14.° | |
| [22] Dimethyl " | $C_2 H_7 P$. | | 25.° | |
| [23] Trimethyl " | $C_3 H_9 P$. | | 40°–42.° | |
| [24] Monethyl " | $C_2 H_7 P$. | | 25.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Diethyl phosphin. | $C_4 H_{11} P$. | | 85.° | |
| [2] Triethyl " | $C_6 H_{15} P$. | .812, 15°5. | 127°5. | |
| [3] " " | " | | 128.° | |
| [4] Triethyl phosphin oxide. | $C_6 H_{15} P O$. | | 240.° | 44.° |
| [5] " " " | " | | | 52°9, s. 42.° |
| [6] " " " | " | | 242°8–243.° | Cryst. 51°9. |
| [7] " " sulphide. | $C_6 H_{15} P S$. | | | 94,° s. 88.° |
| [8] " " selenide. | $C_6 H_{15} P Se$. | | | 112.° |

## LVI. Organic Compounds Containing Boron.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [9] Trimethyl borate. | $C_3 H_9 B O_3$. | .9551, 0.° | 72.° | |
| [10] " " | " | .940, 0.° | 65.° | |
| [11] " " | " | .915, 20.° | | |
| [12] Triethyl " | $C_6 H_{15} B O_3$. | .8849. | 119.° | |
| [13] " " | " | .871. | 121.° | |
| [14] " " | " | .887, 0.° | 120.° | |
| [15] " " | " | .861, 26°5. | | |
| [16] Triamyl " | $C_{15} H_{33} B O_3$. | .870. | 270°–275.° | |
| [17] " " | " | .872, 0.° | 254.° | |
| [18] " " | " | .852, 24.° | | |
| [19] " " | " | .840–855, 28.° | | |
| [20] " " | " | 853, 29.° | | |
| [21] Methyl diethyl borate. | $C_5 H_{13} B O_3$. | .904, 0.° | 100°–105.° | |
| [22] " " " | " | .883, 20.° | | |
| [23] Ethyl diamyl " | $C_{12} H_{27} B O_3$. | .876, 0.° | 210°–215.° | |
| [24] " " " | " | .852, 28.° | | |
| [25] Amyl diethyl " | $C_9 H_{21} B O_3$. | 858, 26.° | 173°–175.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Monamyl borate. | $C_5 H_{11} B O_2$. | .971, 0.° | | |
| [2] " " | " | .949, 20.° | | |
| [3] Monocetyl " | $C_{16} H_{33} B O_2$. | | | 58.° |
| [4] Tetraphenyl diborate. | $C_{24} H_{20} B_2 O_5$. | 1.13.° | | |
| [5] " " | " | 1.124, 0.° | | |
| [6] " " | " | 1.106, 20.° | | |
| [7] Boron triethyl. | $C_6 H_{15} B$. | .6961, 23.° | 95°–97.° | |

## LVII. Organic Compounds Containing Silicon.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [8] Diethyl silicate. | $C_4 H_{10} Si O_3$. | 1.079, 24.° | 350.° | |
| [9] Tetramethyl silicate. | $C_4 H_{12} Si O_4$. | 1.0589, 0.° | 120°–122.° | |
| [10] Trimethyl ethyl silicate. | $C_5 H_{14} Si O_4$. | 1.023. | 133°–135.° | |
| [11] Dimethyl diethyl " | $C_6 H_{16} Si O_4$. | 1.004, 0.° | 143°–146.° | |
| [12] Methyl triethyl " | $C_7 H_{18} Si O_4$. | .989, 0.° | 155°–157.° | |
| [13] Tetrethyl " | $C_8 H_{20} Si O_4$. | .932. | 162°–163.° | |
| [14] " " | " | .933, 20.° | | |
| [15] " " | " | .9676, 0.° | 165°5. | |
| [16] Triethyl amyl " | $C_{11} H_{26} Si O_4$. | .926, 0.° | 216°–225.° | |
| [17] Dimethyl diamyl " | $C_{12} H_{28} Si O_4$. | | 225°–235.° | |
| [18] Diethyl " " | $C_{14} H_{32} Si O_4$. | .915, 0.° | 245°–250.° | |
| [19] Ethyl triamyl " | $C_{17} H_{38} Si O_4$. | .913, 0.° | 280°–285.° | |
| [20] Tetramyl " | $C_{20} H_{44} Si O_4$. | .868, 20.° | 322–325.° | |
| [21] Hexmethyl disilicate. | $C_6 H_{18} Si_2 O_7$. | 1.1441, 0.° | 201°–202°5. | |
| [22] Hexethyl " | $C_{12} H_{30} Si_2 O_7$. | 1.0196, 0.° | 233°–238.° | |
| [23] " " | " | 1.0019, 19°2. | | |
| [24] Tribasic silicopropionic ether. | $Si C_8 H_{20} O_3$. | .9207, 9.° | 159°–162.° | |
| [25] Orthosilicopropionic " | $Si_3 C_6 H_{20} O_3$. | .9207, 0.° | 158°5. | |
| [26] Silicon tetramethyl. | $C_4 H_{12} Si$. | | 30°–31.° | |
| [27] " tetrethyl. | $C_8 H_{20} Si$. | .7657, 22°7. | 152°5. | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Silicon tetrethyl. | $C_8 H_{20} Si.$ | .8341, 0.° | | |
| [2] | Methyl silicic monochlorhydrin. | $Si C_3 H_9 Cl O_2.$ | 1.1954, 0.° | 114°.5–115°.5. | |
| [3] | " " dichlorhydrin. | $Si C_2 H_6 Cl_2 O_2.$ | 1.2595. | 98°–103.° | |
| [4] | " " trichlorhydrin. | $Si C H_3 Cl_3 O.$ | | 82°–86.° | |
| [5] | Ethyl silicic monochlorhydrin. | $Si C_6 H_{15} Cl O_3.$ | 1.0483, 0.° | 155°–157.° | |
| [6] | " " dichlorhydrin. | $Si C_4 H_{10} Cl_2 O_2.$ | 1.144, 0.° | 136°–138.° | |
| [7] | " " trichlorhydrin. | $Si C_2 H_5 Cl_3 O.$ | 1.241, 0.° | 104.° | |
| [8] | Silicon iodoform. | $Si H I_3.$ | 3.362, 0.° | 220.° | |
| [9] | " " | " | 3.314, 20.° | | |

## LVIII. Organic Compounds of Tl, Pb, Zn, Hg, and Al.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [10] | Thallic ethylate. | $C_2 H_5 Tl O.$ | 3.480 to 3.685. | | |
| [11] | " amylate. | $C_5 H_{11} Tl O.$ | 2.465 to 2.518. | | |
| [12] | Lead tetramethyl. | $(C H_3)_4. Pb.$ | 2.034, 0.° | | |
| [13] | " diethyl. | $(C_2 H_5)_2. Pb.$ | 1.55. | 198°–202.° | |
| [14] | " " | " | 1.62. | | |
| [15] | " triethyl. | $(C_2 H_5)_3. Pb.$ | 1.471, 10.° | | |
| [16] | Zinc methyl. | $(C H_3)_2. Zn.$ | 1.386, 10°.5. | 46.° | |
| [17] | " ethyl. | $(C_2 H_5)_2. Zn.$ | 1.182, 18.° | 118.° | |
| [18] | " amyl. | $(C_5 H_{11})_2. Zn.$ | 1.022, 0.° | 220.° | |
| [19] | Mercury methyl. | $(C H_3)_2. Hg.$ | 3.069. | 93°–96.° | |
| [20] | " ethyl. | $(C_2 H_5)_2. Hg.$ | 2.444. | 158°–160.° | |
| [21] | " " | " | | 159.° | |
| [22] | " butyl. | $(C_4 H_9)_2. Hg.$ | 1.7469, 0.° | | |
| [23] | " " | " | 1.7192, 16.° | | |
| [24] | " amyl. | $(C_5 H_{11})_2. Hg.$ | 1.6663, 0.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] β Hexyl mercaptide of mercury. | $C_{12}H_{26}S_2Hg$. | 1.6502, 0.° | | |
| [2] Mercuric iodomethide. | $CH_3IHg$. | | | 143.° |
| [3] " chloramylide. | $C_5H_{11}ClHg$. | | | 86.° |
| [4] " iodamylide. | $C_5H_{11}IHg$. | | | 122.° |
| [5] Aluminum methyl. | $(CH_3)_3Al$. | | 130.° | s. 0°+. |
| [6] " ethyl. | $(C_2H_5)_3Al$. | | 194.° | |

## LIX. Organic Compounds Containing As, Sb, or Bi.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [7] Methyl arsenite. | | 1.428, 9°6. | 128°–129.° | |
| [8] Ethyl " | | 1.224, 0.° | 166°–168.° | |
| [9] Amyl " | | 1.0525, 0.° | 288.° | |
| [10] Methyl arsenate. | | 1.5591, 14°5. | 213°–215.° | |
| [11] Ethyl " | | 1.3264, 0.° | | |
| [12] " " | | 1.3161, 8°8. | | |
| [13] Arsen-dimethyl. | $(CH_3)_2As$. | | 170.° | s. 6.° |
| [14] Arsen-diethyl. | $(C_2H_5)_2As$. | | 185°–190.° | |
| [15] Arsen-triethyl. | $(C_2H_5)_3As$. | 1.151, 16°7. | 140°–180.° | |
| [16] Arsenmethyl chloride. | $CH_3AsCl_2$. | | 133.° | |
| [17] " iodide. | $CH_3AsI_2$. | | | 25.° |
| [18] " oxide. | $CH_3AsO$. | | | 95.° |
| [19] " sulphide. | $CH_3AsS$. | | | a. 110.° |
| [20] Alkarsine. | $C_2H_6AsO$.(?) | 1.462, 15.° | | |
| [21] Stib-trimethyl. | $(CH_3)_3Sb$. | 1.523, 15.° | 80°6. | |
| [22] Stib-triethyl. | $(C_2H_5)_3Sb$. | 1.3244, 16.° | 158°5. | |
| [23] Stib-triamyl. | $(C_5H_{11})_3Sb$. | 1.1333, 17.° | | |
| [24] " " | " | 1.0587. | | |
| [25] Stib-triethyl chloride. | $C_6H_{15}SbCl_2$. | 1.540, 17.° | | |
| [26] " " bromide. | $C_6H_{15}SbBr_2$. | 1.953, 17.° | | s.—10.° |
| [27] " " iodide. | $C_6H_{15}SbI_2$. | | | 70°5. |
| [28] Bismuth-triethyl. | $(C_2H_5)_3Bi$. | 1.82. | | |

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## LX. Organic Compounds of Tin.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Stann-tetramethyl. | $(C H_3)_4$. Sn. | | 140°–145.° | |
| [2] " " | " | 1.3138, 0.° | 78.° | |
| [3] Stann-diethyl. | $(C_2 H_5)_2$. Sn. | 1.558, 15.° | | |
| [4] " " | " | 1.192. | 176°–180.° | |
| [5] Stann-triethyl. | $(C_2 H_5)_6$. $Sn_2$. | 1.4115, 0.° | 268°–272.° | |
| [6] Stann-tetrethyl. | $(C_2 H_5)_4$. Sn. | | 180.° | |
| [7] " " | " | 1.187, 13°6. | 181.° | |
| [8] Stann-dimethyl-diethyl. | $(CH_3)_2(C_2H_5)_2$.Sn | 1.2319, 19.° | 144°–146.° | |
| [9] " " " | " | 1.2603, 0.°) | | |
| [10] " " " | " | 1.2509, 0.°) | | |
| [11] Stann-ethyl-trimethyl. | $(C H_3)_3 C_2 H_5$. Sn. | 1.243. | 125°–128.° | |
| [12] Stann-methyl-triethyl. | $C H_3 (C_2 H_5)_3$. Sn. | | 162°–163.° | |
| [13] Ethylene-stannethyl. | $(C_2 H_5)_4$. $Sn_2$. | 1.410. | | |
| [14] Stann-triethyl-phenyl. | $(C_2 H_5)_3 C_6 H_5$. Sn. | 1.2639, 0.° | 254.° | |
| [15] Stann-triethyl ethylate. | $C_8 H_{20}$ Sn O. | 1.2634, 0.° | 269°–273.° | 43.° |
| [16] Stann-dimethyl chloride. | $C_2 H_6$ Sn $Cl_2$. | | 188°–190.° | 90.° |
| [17] " " bromide. | $C_2 H_6$ Sn $Br_2$. | | 208°–210.° | |
| [18] " " iodide. | $C_2 H_6$ Sn $I_2$. | 2.872, 22.° | 228.° | 30.° |
| [19] Stann-trimethyl iodide. | $C_3 H_9$ Sn I. | 2.155, 18.° | 188°–190.° | |
| [20] " " " | " | 2.1432, 0.° } | 170.° | |
| [21] " " " | " | 2.1096, 18.° } | | |
| [22] Stann-diethyl chloride. | $C_4 H_{10}$ Sn $Cl_2$. | | 220.° | 60.° |
| [23] " " " | " | | | 85.° |
| [24] " " bromide. | $C_4 H_{10}$ Sn $Br_2$. | | 232°–233.° | |
| [25] " " iodide. | $C_4 H_{10}$ Sn $I_2$. | | 245°–246.° | 42.° |
| [26] " " " | " | 1.8. | | |
| [27] " " " | " | 2.0329, 15.° | Begins, 208° | |
| [28] " " " | " | | | 45.° |
| [29] Stann-triethyl chloride. | $C_6 H_{15}$ Sn Cl. | 1.428, 8.° | 208°–210.° | |
| [30] " " " | " | 1.320. | | |
| [31] " " bromide. | $C_6 H_{15}$ Sn Br. | 1.630. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Stann-triethyl bromide. | $C_6 H_{15} Sn Br.$ | | 222°–224.° | |
| [2] " " iodide. | $C_6 H_{15} Sn I.$ | 1.850. | 180°–200.° | |
| [3] " " " | " | 1.833, 22.° | 235°–238.° | |
| [4] Ethstannethyl chloride. | $C_{10} H_{25} Sn_2 Cl.$ | 1.30. | | |
| [5] " bromide. | $C_{10} H_{25} Sn_2 Br.$ | 1.48. | | |
| [6] " iodide. | $C_{10} H_{25} Sn_2 I.$ | 1.724. | | |

## LXI. Miscellaneous Organic Compounds.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [7] Cane sugar + Na I. | $\{ (C_{12} H_{22} O_{11})_2 \}$ | 1.854. | | |
| [8] " " " | $\{ (Na I)_3 . 3aq. \}$ | | | |
| [9] Grape sugar + Na Cl. | $\{ (C_6 H_{12} O_6)_2 . \}$ | 1.55–1.59, 11.° | | |
| [10] " " " | $\{ Na Cl . H_2 O. \}$ | | | |
| [11] Triethyl phosphin + Pt $Cl_2$. | $(C_6 H_{15} P)_2 . Pt Cl_2.$ | 1.5, 10.° | | 150.° |

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# SUPPLEMENT TO THE FOREGOING TABLES.

CONTAINING DETERMINATIONS ACCIDENTALLY OMITTED, AND OTHERS PUBLISHED SINCE THE PREVIOUS PORTIONS OF THE WORK WERE COMPLETED.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Iron. Pure. Melted in H. | Fe. | 7.880, 16.° | | |
| [2] | " Ditto, hammered. | " | 7.868, 16.° | | |
| [3] | " " wire drawn. | " | 7.847, 16.° | | |
| [4] | " Pure. Fused in crucible. | " | 7.833, 16.° | | |
| [5] | Copper. Hammered. | Cu. | 8.855. | | |
| [6] | " " | " | 8.878. | | |
| [7] | " Rolled. | " | 8.879. | | |
| [8] | " " | " | 8.898. | | |
| [9] | " Annealed. | " | 8.884. | | |
| [10] | " " | " | 8.896. | | |
| [11] | Ammonium silicofluoride. | $2\,Am\,F.\,Si\,F_4$. | 1.970. | | |
| [12] | Ammonium stannofluoride. | $2\,Am\,F.\,Sn\,F_4$. | 2.887. | | |
| [13] | Potassium zircofluoride. | $2\,K\,F.\,Zr\,F_4$. | 3.582. | | |
| [14] | " tantalofluoride. | $2\,K\,F.\,Ta\,F_5$. | 4.056. | | |
| [15] | Lithium silicofluoride. | $2\,Li\,F.\,Si\,F_4.\,2\,H_2O$. | 2.244. | | |
| [16] | Potassium titanofluoride | $2\,K\,F.\,Ti\,F_4.\,H_2O$. | 2.992. | | |
| [17] | " niobofluoride. | $2\,K\,F.\,NbO\,F_3.\,H_2O$. | 2.813. | | |
| [18] | Ammonium palladiochloride. | $2\,Am\,Cl.\,Pd\,Cl_4$. | 3.065. | | |
| [19] | Potassium " | $2\,K\,Cl.\,Pd\,Cl_4$. | 2.739. | | |
| [20] | Magnesium platinchloride. | $Mg\,Cl_2.\,Pt\,Cl_4.\,12\,H_2O$. | 2.060. | | |
| [21] | Tricyanogen trichloride. | $Cy_3\,Cl_3$. | 1.32. | | |
| [22] | Chloronitric acid. | | 1.3677, 8.° | —7°2. | |
| [23] | Matlockite. | $Pb\,Cl_2.\,Pb\,O$. | 7.21. | | |
| [24] | Mendipite. | $Pb\,Cl_2.\,2\,Pb\,O$. | 7.0–7.1. | | |
| [25] | Cadmium ammoniochloride. | $Cd\,Cl_2.\,2\,N\,H_3$. | 2632. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Potassium stannobromide. | $2\,K\,Br.\,Sn\,Br_4$. | 3.783. | | |
| [2] | Barium platinbromide. | $Ba\,Br_2.Pt\,Br_4.10\,H_2O$ | 3.713. | | |
| [3] | Bromonitric acid. | $N\,O\,Br_3$. | 2.628, 22°6. | | |
| [4] | Phosphorus sulphobromide. | $P_2\,S_3\,Br_4$. | 2.2621, 17.° | | |
| [5] | Carbon bromochloride. | $C\,Cl_3\,Br$. | 2.058, 0.° | 104°3. | |
| [6] | " " | " | 2.017, 19°5. | | |
| [7] | " " | " | 1.842, 100.° | | |
| [8] | Selenium moniodide. | Se I. | | | 70.° |
| [9] | " tetriodide. | $Se\,I_4$. | | | 75°–80° |
| [10] | Cyanogen iodide. | Cy I. | 1.85+ | | |
| [11] | Magnesium platiniodide. | $Mg\,I_2.\,Pt\,I_4.\,9\,H_2\,O$. | 3.458. | | |
| [12] | Schwartzembergite. | $Pb\,I_2.\,2\,Pb\,O$. | 6.3. | | |
| [13] | " | " | 5.7. | | |
| [14] | Nickel ammonioiodide. | $Ni\,I_2.\,6\,N\,H_3$. | 2.101. | | |
| [15] | Iodine pentoxide. | $I_2\,O_5$. | 5.037, 0.° | | |
| [16] | " " | " | 5.020, 51.° | | |
| [17] | Chromium trioxide. | $Cr\,O_3$. | 2.775. Extremes | | |
| [18] | " " | " | 2.804. of six. | | |
| [19] | Yttrium monoxide. | Y O. | 5.03. | | |
| [20] | Erbium " | Er O. | 8.8–8.9. | | |
| [21] | Quartz. Amethyst. | $Si\,O_2$. | 2.744. | | |
| [22] | " " | " | 2.659. | | |
| [23] | " Smoky. | " | 2.651. | | |
| [24] | " " | " | 2.658. | | |
| [25] | " Rose. | " | 2.651. | | |
| [26] | " " | " | 2.653. | | |
| [27] | " " | " | 2.658. | | |
| [28] | " Milky. | " | 2.618. | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Selenium sulphide. | Se S. | 3.056, 0.° | | |
| [2] " " | " | 3.035, 52.° | | |
| [3] Bismuth nickel sulphide. | $Bi_{24} Ni_5 S_2$. | 9.15. | | |
| [4] Silver chlorate. | $Ag Cl O_3$. | 4.439. | | |
| [5] Lead " | $Pb (Cl_2 O_3)_2 . H_2 O$. | 3.989. | | |
| [6] Mercury " | $Hg_2 Cl_2 O_7 . H_2 O$. | 5.151. | | |
| [7] Potassium bromate. | $K Br O_3$. | 3.218. | | |
| [8] Magnesium " | $Mg (Br O_3)_2 . 6 H_2 O$. | 2.289. | | |
| [9] Cadmium " | $Cd (Br O_3)_2 . 2 H_2 O$. | 3.758. | | |
| [10] | $K_2 S_2 O_6$. | 2.277. | | |
| [11] | $Na_2 S_2 O_6 . 2 H_2 O$. | 2.189. | | |
| [12] | $Ca S_2 O_6 . 4 H_2 O$. | 2.180. | | |
| [13] | $Mg S_2 O_6 . 6 H_2 O$. | 1.666. | | |
| [14] Sodium sulphate. | $Na_2 S O_4$. | 2.55. Native. | | |
| [15] " " | " | 2.73. | | |
| [16] Yttrium " | $3 (Y S O_4) . 8 H_2 O$. | 2.52. | | |
| [17] Erbium " | $3 (Er S O_4) . 8 H_2 O$. | 3.17. | | |
| [18] Didymium " | | 2.82. | | |
| [19] Sodium selenate. | $Na_2 Se O_4$. | 3.098. | | |
| [20] Ammonium selenate. | $Am_2 . Se O_4$. | 2.162. | | |
| [21] Manganous " | $Mn Se O_4 . 2 H_2 O$. | 2.949. | | |
| [22] " " | $Mn Se O_4 . 5 H_2 O$. | 2.334. | | |
| [23] " " | $Mn Se O_4 . 6 H_2 O$. | 1.928. | | |
| [24] Ferrous " | $Fe Se O_4 . 7 H_2 O$. | 2.073. | | |
| [25] Nickelous " | $Ni Se O_4 . 6 H_2 O$. | 2.314. | | |
| [26] Potassium manganese selenate. | $Mn K_2 (Se O_4)_2 . 2 H_2 O$. | 3.070. | | |
| [27] Ammonium magnesium selenate. | $Mg Am_2 (Se O_4)_2 . 6 H_2 O$. | 2.035. | | |
| [28] Sodium octovanadate. | $Na_{12} V_8 O_{26} . 4 H_2 O$. | 2.85, 18.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Silver octovanadate. | $Ag_{12} V_8 O_{26}$. | 5.67, 18.° | | |
| [2] Thallium orthovanadate. | $Tl_3 V O_4$. | 8.6, 17.° | | |
| [3] " metavanadate. | $Tl V O_3$. | 6.019, 11.° | | |
| [4] " pyrovanadate. | $Tl_4 V_2 O_7$. | 8.21, 18°5. Precipitated. | | |
| [5] " " | " | 8.812, 18°5. Fused. | | |
| [6] " octovanadate. | $Tl_{12} V_8 O_{26}$. | 8.59, 17°5, | | |
| [7] " decavanadate. | $Tl_{12} V_{10} O_{31}$. | 7.86, 17.° | | |
| [8] Potassium hydrogen arsenate. | $K H_2 As O_4$. | 2.862. | | |
| [9] Sodium antimonite. | $Na Sb O_2 . 3 H_2 O$. | 2.864, | | |
| [10] _____ | $Na Sb_3 O_5 . H_2 O$. | 5.05. | | |
| [11] _____ | $P Cl_5 . S O_2$. | 1.667, 14.° | 100.° | |
| [12] Potassium manganidcyanide. | $K_3 Cy_6 Mn$. | 1.821. | | |
| [13] Cyanic acid. l. | Cy H O. | 1.1558,–20.° | | |
| [14] " " " | " | 1.140, 0.° | | |
| [15] Hydrocyanic acid. | Cy H. | .710, 6.° | | |
| [16] " " | " | .706, 2°8. | | |
| [17] " " | " | .7058, 7.° | 26°5. | s.—15.° |
| [18] " " | " | .6969, 18.° | | |
| [19] Hydrosulphocyanic acid | Cy H S. | 1.0013, 10.° | | |
| [20] " " | " | 1.022. | | |
| [21] " " | " | 1.0082. | | |
| [22] Zinc and calcium. | $Zn_{12} Ca$. | 6.3726. | | |
| [23] " " " | " | 6.369. | | |
| [24] Zinc and antimony. | $Zn_3 Sb_2$. | 6.48. | | |
| [25] Lead and platinum. | Pb Pt. | 15.77. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Tin and copper.* | $Sn_5$ Cu. | 7.52. | | |
| [2] | " " " | $Sn_4$ Cu. | 7.50. | | |
| [3] | " " " | $Sn_3$ Cu. | 7.53. | | |
| [4] | " " " | $Sn_2$ Cu. | 7.74. | | |
| [5] | " " " | Sn Cu. | 8.12. | | |
| [6] | " " " | $Sn_2$ $Cu_3$. | 8.30. | | |
| [7] | " " " | Sn $Cu_2$. | 8.57. | | |
| [8] | " " " | Sn $Cu_3$. | 8.96. | | |
| [9] | " " " | Sn $Cu_4$. | 8.80. | | |
| [10] | " " " | Sn $Cu_5$. | 8.87. | | |
| [11] | " " " | Sn $Cu_6$. | 8.91. | | |
| [12] | " " " | Sn $Cu_7$. | 8.90. | | |
| [13] | " " " | Sn $Cu_8$. | 8.86. | | |
| [14] | " " " | Sn $Cu_{10}$. | 8.83. | | |
| [15] | " " " | Sn $Cu_{15}$. | 8,80. | | |
| [16] | Hexyl hydride. | $C_6$ $H_{13}$. H. | .6620, 19°5. | 65°–70.° | |
| [17] | " " | " | .6641, 18.° | | |
| [18] | Heptyl " | $C_7$ $H_{15}$. H. | .689, 27.° | 96.° | |
| [19] | " " | " | .6910, 19.° | 97°–99.° | |
| [20] | " " | " | .6915, 18.° | | |
| [21] | Dimethyl diethyl methane. | $C_7$ $H_{16}$. | .6958, 20°5. | 86°–87.° Two Samples. | |
| [22] | " " " | " | .709, 16.° | 89°5–90.° | |
| [23] | Octyl hydride. | $C_8$ $H_{17}$. H. | .7207, 15°5. | 122°–125.° | |
| [24] | " " | " | .7165, 15°6. | 118°–122.° | |
| [25] | Nonyl " | $C_9$ $H_{19}$. H. | .7279, 13°5. | 147°–148.° | |
| [26] | Decatyl " | $C_{10}$ $H_{21}$. H. | .7394, 13°5. | 166°–168.° | |
| [27] | Hexylene. | $C_6$ $H_{12}$. | .6996, 0.° | 65°–66.° | |
| [28] | " | " | .6997, 0.° | 65°–66.° | |
| [29] | Phenyl butylene. | $C_{10}$ $H_{12}$. | .9015, 15°5. | 176°–178.° | |
| [30] | Benzyl toluol. | $C_{14}$ $H_{14}$. | .995, 17°5. | 279°–280.° | |

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* All the determinations in this series represent the alloy in bars. Riche also gives determinations for the same alloys powdered.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] From cupric camphorate. | $C_8 H_{14}$. | .793. | 105.° | |
| [2] Macene. | $C_{10} H_{16}$. | .8529, 17°5. | 160.° | |
| [3] Citronyl. | " | .857. | 165.° | |
| [4] Oil of bergamot. | " | .856. | 183.° | |
| [5] " orange. | " | .835. | 180.° | |
| [6] From copaiva. | $C_{15} H_{24}$. | .885. | 250.° | |
| [7] Petrolene. | " | .891. | 280.° | |
| [8] Ethyl alcohol. | $C_2 H_6 O$. | .7958, 15.° | | |
| [9] " " | " | .8083, 0.° | | |
| [10] " " | " | .7157, 99°9. | | |
| [11] " " | " | .822, 20.° | 79.° | |
| [12] " " | " | .8090, 17.° | 78°53. | |
| [13] " " | " | 79481, 11.° | 78.° | |
| [14] Propyl " | $C_3 H_8 O$. | .8198, 0.° | | |
| [15] " " | " | .8125, 9°6. | | |
| [16] " " | " | .7797, 50°1. | 98.° | |
| [17] " " | " | .7494, 84.° | | |
| [18] " " | " | .8066, 15.° | 97°41. | |
| [19] " " iso. | " | 7876, 16.° | 82°85. | |
| [20] Hydrate of isopropyl alcohol. | $(C_3 H_8 O)_2 . H_2 O$. | | 80.° | |
| [21] " " " | $(C_3 H_8 O)_3 . 2 H_2 O$. | .832, 15.° | 78°–80.° | |
| [22] " " " | $(C_3 H_8 O)_3 . H_2 O$. | .800, 15.° | 81.° | |
| [23] Trimethyl carbinol. | $C_4 H_{10} O$. | .7788, 30.° | 82°5. | 25°–25°5. |
| [24] " " | " | .8075, 0.° | | |
| [25] " " | " | .7792, 37.° | 82°94. | |
| [26] Hydrate of the above. | $(C_4 H_{10} O)_2 . H_2 O$. | .8276, 0.° | 80.° | |
| [27] Butyl alcohol. Normal. | $C_4 H_{10} O$. | .8112, 15.° | 114°–116.° | |
| [28] " " " | " | .8135, 22.° | 116°88.° | |
| [29] " " Iso. | " | .8025, 19.° | 118°–119.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Dimethyl ethyl carbinol. | $C_5 H_{12} O$. | .828, 0.° | 99°–100.° | s.—30.° |
| [2] | Amyl alcohol. | " | .8148, 14.° | 132.° | |
| [3] | " " | " | .8199, 14.° | 132.° | |
| [4] | " " | " | .826, 0.° | 130°–130°2. | |
| [5] | " " | " | .833, 0.° | 121.° | |
| [6] | " " | " | .8244, 0.° | 129°–130°1. | |
| [7] | " " | " | .8144, 15.° | | |
| [8] | " " | " | .8102, 21°5. | | |
| [9] | " " | " | .8263, 0.° | | |
| [10] | " " | " | .8123, 19°7. | | |
| [11] | Dimethyl pseudopropyl carbinol. | $C_6 H_{14} O$. | .8364, 0.° | 112°–113.° | s.—35.° |
| [12] | Hexyl alcohol. | " | .8306, 0.° | 135.° Two Samples. | |
| [13] | " " | " | .8266, 0.° | 135.° | |
| [14] | Triethyl carbinol. | $C_7 H_{16} O$. | .8593, 0.° | 140°–142.° | |
| [15] | Butyl oxide. | $C_8 H_{18} O$. | .784, 0.° | 140°5. | |
| [16] | " " | " | .7685, 20.° | | |
| [17] | " " | " | .7555, 40.° | | |
| [18] | Acetic acid. | $C_2 H_4 O_2$. | 1.05533, 15.° | 117.° | 16°45. |
| [19] | " " | " | 1.0026, 20.° | 118°10. | |
| [20] | Propionic acid. | $C_3 H_6 O_2$. | .9961, 19.° | 140°71. | |
| [21] | " " | " | 1.0143, 0.° | 146°6. | |
| [22] | " " | " | .9607, 49°6. | | |
| [23] | " " | " | .9062, 99°8. | | |
| [24] | Butyric " | $C_4 H_8 O_2$. | .9580, 14.° | 162°32. | 0.°s.—18° |
| [25] | " " | " | .9601, 14.° | 162°63. | |
| [26] | " " Iso. | " | .9503, 20.° | 154°11. | |
| [27] | " " | " | .9697, 0.° | 155°5. | |
| [28] | " " | " | .9160, 52°6. | | |
| [29] | " " | " | .8665, 99°8. | | |
| [30] | " " | " | .8220, 139°8. | | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Valeric acid. | $C_5 H_{10} O_2$. | .9505, 0.° | 173°5–174°5. | |
| [2] | " " | " | .9331, 19°5.° | | |
| [3] | " " | " | .9465, 0.° | 171°5. | |
| [4] | " " | " | .9285, 20°2.° | | |
| [5] | " " | " | .9468, 0.° | 171°–172.° | |
| [6] | " " | " | .9295, 19°7.° | | |
| [7] | " " | " | .9462, 0.° | 172.° | |
| [8] | " " | " | .9299, 18°8. | | |
| [9] | " " | " | .9470, 0.° | | |
| [10] | " " | " | .8972, 54°65. | 178.° | |
| [11] | " " | " | .8542, 99°9. | | |
| [12] | " " | " | .8095, 147°5. | | |
| [13] | Caproic " | $C_6 H_{12} O_2$. | | 204°5–205.° | |
| [14] | Oenanthic acid. | $C_7 H_{14} O_2$. | | 222°–224.° | s.—10°5. |
| [15] | " " | " | .9212, 24.° | 223°–224.° | –8°5–18.° |
| [16] | Pelargonic " | $C_9 H_{18} O_2$. | .9065, 17.° | 253°–254.° | s. 10°— |
| [17] | Acetic anhydride. | $C_4 H_6 O_3$. | 1.0793, 15.° | | |
| [18] | Ethyl acetate. | $C_4 H_8 O_2$. | .868, 24.° | 74.° | |
| [19] | " " | " | .9068, 15.° | 77.° | |
| [20] | Propyl " | $C_5 H_{10} O_2$. | .8992, 15.° | 101°98, | |
| [21] | Butyl " | $C_6 H_{12} O_2$. | .8768, 23.° | 124°36. | |
| [22] | Hexyl " | $C_8 H_{16} O_2$. | .889. | 168°7, | |
| [23] | Ethyl propionate. | $C_5 H_{10} O_2$. | .8945, 17.° | 98°80. | |
| [24] | " " | " | .8964, 16.° | 98°84. | |
| [25] | Propyl " | $C_6 H_{12} O_2$. | .8885, 13.° | 122°44. | |
| [26] | Butyl " | $C_7 H_{14} O_2$. | .8828, 15.° | 145°99. | |
| [27] | Methyl butyrate. | $C_5 H_{10} O_2$. | .9056, 0.° | | |
| [28] | " " | " | .8625, 38°65. | 93.° | |
| [29] | " " | " | .815, 78°6. | | |
| [30] | Ethyl " | $C_6 H_{12} O_2$. | .9003, 18.° | 121°07. | |
| [31] | " " | " | .8990, 17.° | 121°09. | |

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[31] Linnemann. A.C.P.160.195

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Ethyl butyrate. | $C_6 H_{12} O_2$. | .890, 0.° | | |
| [2] | " " | " | .871, 18°8. | | |
| [3] | " " | " | .831, 55°6. | 113.° | |
| [4] | " " | " | .7794, 100°1. | | |
| [5] | Propyl " | $C_7 H_{14} O_2$. | .878, 15.° | 143°42. | |
| [6] | Butyl " | $C_8 H_{16} O_2$. | .879, 0.° | 149°5. | |
| [7] | " " | " | .8760, 12.° | 164°77. | |
| [8] | Isobutyl " | " | .8798, 0.° | | |
| [9] | " " | " | .86635, 16.° | 150°–153.° | |
| [10] | " " | " | .81838, 98°4. | | |
| [11] | " isobutyrate. | " | .8751, 0.° | | |
| [12] | " " | " | .86064, 15.° | 144°–145.° | |
| [13] | " " | " | .81192, 98°4. | | |
| [14] | Ethyl valerate. | $C_7 H_{14} O_2$. | .894, 0.° | | |
| [15] | " " | " | .8765, 20.° | 144°6. | |
| [16] | " " | " | .8616, 40.° | | |
| [17] | " caproate. | $C_8 H_{16} O_2$. | .8765, 17°5. | 164.9–165°9. | |
| [18] | " " | " | .8898, 0.° | | |
| [19] | " " | " | .8732, 20.° | 165°5–166.° | |
| [20] | " " | " | .8594, 40.° | | |
| [21] | " " | " | .887, 0.° | | |
| [22] | " " | " | .8705, 20.° | 160°4. | |
| [23] | " " | " | .8566, 40.° | | |
| [24] | Hexyl " | $C_{12} H_{24} O_2$. | .865. | 245°6. | |
| [25] | Ethyl heptylate. | $C_9 H_{18} O_2$. | .874, 24.° | 187°–188.° | |
| [26] | Methyl nonylate. | $C_{10} H_{20} O_2$. | .8765, 17°5, | 213°–214.° | |
| [27] | Ethyl " | $C_{11} H_{22} O_2$. | .8655, 17°5. | 227°–228.° | |
| [28] | Propionic aldehyde. | $C_3 H_6 O$. | .8074, 21.° | 48°77. | |
| [29] | Butyric " Iso. | $C_4 H_8 O$. | .803, 20.° | 60°–62.° | |
| [30] | Valeric " | $C_5 H_{10} O$. | .768, 12°5. | 92°5. | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Valeric aldehyde. | $C_5 H_{10} O$. | | 90°5–91.° | |
| [2] Polyvaleral. | $(C_5 H_{10} O)_n$. | .90. | 215.° | |
| [3] Acetone. | $C_3 H_6 O$. | .8008, 15.° | | |
| [4] « | « | .7938, 18.° | 56°–59.° | |
| [5] « | « | .7975, 15.° | 56°–58°5. | |
| [6] Propione. | $C_5 H_{10} O$. | .813, 20.° | 100°–101.° | |
| [7] Ethyl acetone. | « | .815, 17°5. | 100°–102.° | |
| [8] Butyrone. | $C_6 H_{12} O$. | .819, 20.° | 144.° | |
| [9] Ethyl propyl ketone. | « | .818, 17°5 | 122°–125.° | |
| [10] Valerone. | $C_7 H_{14} O$. | .833, 20.° | 181°–182.° | |
| [11] Methyl caprone. | « | .813, 20.° | 155°–156.° | |
| [12] Methyl amyl acetone. | « | .8747, 17.° | 143°–145.° | |
| [13] Diethyl « | « | .898, 12.° | 182°5. | |
| [14] Caprone. | $C_8 H_{16} O$. | .822, 20.° | 220°–221.° | |
| [15] Malonic acid. | $C_3 H_4 O_4$. | | | 140.° |
| [16] Lactic « | $C_3 H_6 O_3$. | 1.2485, 15.° | | |
| [17] Methylsalicylic acid. | $C_8 H_8 O_3$. | 1.1845, 15.° | | |
| [18] « « | « | 1.1969, 0.° | 223.° | |
| [19] « « | « | 1.1819, 16.° | | |
| [20] Butyl carbonate. | $C_9 H_{18} O_3$. | .9407, 0.° | 207.° | |
| [21] « « | « | .9244, 20.° | | |
| [22] « « | « | .9111, 40.° | | |
| [23] Ethyl suberate. | $C_{12} H_{22} O_4$. | .991, 15.° | 233°–235.° | |
| [24] Ethyl benzoate. | $C_9 H_{10} O_2$. | 1.0502, 16.° | 211°16. | |
| [25] Propyl « | $C_{10} H_{12} O_2$. | 1.0316, 16.° | 229°47. | |
| [26] Butyl « | $C_{11} H_{14} O_2$. | 1.000, 20.° | 247°32. | |
| [27] Cetyl « | $C_{23} H_{38} O_2$. | | | 30.° |
| [28] Methyl propargylate. | $C_4 H_6 O$. | .83, 12°5. | 61°–62.° | |
| [29] Amyl « | $C_8 H_{14} O$. | .84, 12.° | 140°–145.° | |
| [30] Methyl isopropylsalicylate. | $C_{11} H_{14} O_3$. | 1.062, 20.° | 250.° | |
| [31] Methyl pyruvate. | $C_4 H_6 O_3$. | 1.154. 0.° | 134°–137.° | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Ethyl diethylglycollate. | | .98. | 175°–176.° | |
| [2] Pyruvic acetate. | $C_5 H_8 O_3$. | 1.053, 11.° | 175. | |
| [3] Cocinin. | $C_{42} H_{80} O_6$. | | | 33°5–s.29°5. |
| [4] Ethyl glycide. | $C_5 H_{10} O_2$. | .94, 12.° | | |
| [5] Methyl allyl oxide. | $C_4 H_8 O$. | .77, 11.° | 46.° | |
| [6] Propargylic alcohol. | $C_3 H_4 O$. | .9628, 21.° | 110°–115.° | |
| [7] From valeral. | $C_{20} H_{38} O_3$. | .895—.900. | 260°–290.° | |
| [8] " " | $C_{10} H_{18} O$. | .862, 0.° | 195.° | |
| [9] " " | " | .848, 20.° | | |
| [10] " " | " | .944, 0.° | 190,° | |
| [11] " diethyl acetone. | $C_{20} H_{34} O_2$. | .934, 12.° | 249.° | |
| [12] Butyrone pinakone. | $C_{14} H_{30} O_2$. | .87, 20.° | | 68.° s. 57.° |
| [13] Butyl phenyl ketone. | $C_{11} H_{16} O$. | .993, 17°5. | 225°–226.° | |
| [14] Benzyl anisol. | $C_{14} H_{14} O$. | 1.073, 0.° | 305.° | |
| [15] " " | " | .993, 100.° | | |
| [16] Anisic alcohol. | | 1.1093, 26.° | 258°8. | 25.° |
| [17] " " | | 1.0507, 100.° | | |
| [18] Methyl saligenine. | $C_8 H_{10} O_2$. | 1.1200, 23.° | 247°5. | |
| [19] " " | " | 1.0532, 100.° | | |
| [20] Thymol. From Ajowan oil. | $C_{10} H_{14} O$. | .939, 25°5. l. | 226.° | 53.° |
| [21] Isomer of terpinol. | $C_{20} H_{34} O_2$. | .853. | 157.° | |
| [22] Inulin. | $C_6 H_{10} O_5$. | 1.470. | | |
| [23] Isobutyl cyanide. | $C_4 H_9 Cy$. | .8226, 0.° | 126°–128.° | |
| [24] " " " | " | .8146, 10.° | | |
| [25] " " | " | .8060, 20.° | | |
| [26] Propylamine. | $C_3 H_9 N$. | .7186, 20.° | 49.° | |
| [27] Butylamine. | $C_4 H_{11} N$. | .7401, 20.° | 76°–77.° | |
| [28] " Iso. | " | .7357, 15.° | 67°5. | |
| [29] Trimethyl carbinolamine. | " | .6987, 15.° | 45°–46.° | |

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[29] Linnemann. A. C. Phys. (4). 27. 268.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Tributylamine. | $C_{12}H_{27}N$. | .791, 0.° | | |
| [2] | " | " | .7782, 20.° | 211°–215.° | |
| [3] | " | " | .7677, 40.° | | |
| [4] | Dimethyl aniline. | $C_8H_{11}N$. | .9553. | 192.° | s. 0°5. |
| [5] | " toluidine. | $C_9H_{13}N$. | .9324. | 186.° | |
| [6] | " " | " | .9368. | 205.° Different Samples. | |
| [7] | " " | " | .988. | 210.° | |
| [8] | Cumidine. | " | .9633. | 225°–227.° | |
| [9] | Dimethyl xylidine. | $C_{10}H_{15}N$. | .9293. | 196.° | |
| [10] | " cumidine. | $C_{11}H_{17}N$. | .9076. | 213°–214.° | |
| [11] | Coniine. Artificial. | $C_8H_{15}N$. | .913, 0.° | | |
| [12] | " " | " | .899, 15.° | 168°–170.° | |
| [13] | " " | " | .842, 90.° | | |
| [14] | " Natural. | " | .886, 0.° | | |
| [15] | " " | " | .873, 15.° | 168.° | |
| [16] | " " | " | .811, 90.° | | |
| [17] | Paradiconiine. | $C_{16}H_{27}N$. | .915, 15.° | a. 210. | |
| [18] | Methyl formamide. | $C_2H_5NO$. | 1.011, 19.° | 190.° | |
| [19] | Ethyl " | $C_3H_7NO$. | .952, 21.° | 196°–197.° | |
| [20] | Diethyl " | $C_5H_{11}NO$. | .908, 19.° | 175°–178.° | |
| [21] | Allyl nitrate. | $C_3H_5NO_3$. | 1.09, 10.° | 106.° | |
| [22] | Ethylene dinitrate. | $C_2H_4N_2O_6$. | 1.4837, 8.° | | |
| [23] | " " (?). | " | 1.48. | | |
| [24] | Propylene " | $C_3H_6N_2O_6$. | 1.335, 5.° | | |
| [25] | Mononitric glycol. | $C_2H_5NO_3$. | 1.31, 11.° | | |
| [26] | Acetonitric " | $C_4H_7NO_5$. | 1.29, 18.° | | |
| [27] | Nitrolactic acid. | $C_3H_5NO_5$. | 1.35, 12°8. | | |
| [28] | Ethyl nitroglycollate. | $C_4H_7NO_5$. | 1.2112, 15°2. | 180°–182.° | |
| [29] | " nitrolactate. | $C_5H_9NO_5$. | 1.1534, 13.° | 178, p. d. | |
| [30] | " nitrotartronate. | $C_7H_{11}NO_7$. | 1.2778, 16.° l. | | 45°–46.° |
| [31] | Diethyl nitromalate. | $C_8H_{13}NO_7$. | 1.2094, 16.° | | |

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| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Paraffinic acid. | $C_{26}H_{26}NO_{10}$. | 1.14, 15.° | | |
| [2] Acetonitrose. | | 1.3487, 18.° | | 145.° |
| [3] Propyl chloride. | $C_3H_7.Cl.$ | .9160, 18.° | 46°.36 | |
| [4] " " | " | .8959, 19.° | 46°.44. | |
| [5] " " Iso. | " | .8722, 14.° | 36°–37.° | |
| [6] Butyl " | $C_4H_9.Cl.$ | .8972, 14.° | 77°.96. | |
| [7] " " Iso. | " | .8798, 15.° | 68°.5. | |
| [8] Heptyl " | $C_7H_{15}Cl.$ | | 140°–142.° | |
| [9] Nonyl " | $C_9H_{19}Cl.$ | .8962, 14.° | 190°–198.° | |
| [10] Isovinyl " | $C_2H_3Cl.$ | 1.406. | | |
| [11] Propylene chloride. | $C_3H_6Cl_2.$ | 1.1656, 14.° | 96°.82. | |
| [12] " " | " | 1.184, 0.° | | |
| [13] " " | " | 1.155, 25.° | 96.° | |
| [14] " " | " | 1.182, 0.° | | |
| [15] " " | " | 1.153, 25.° | | |
| [16] Methylchloracetol. | $C_3H_6Cl_2.$ | 1.1058, 0.° | | |
| [17] " " | " | 1.0744, 25,° | 70.° | |
| [18] " " | " | 1.1125, 0.° | | |
| [19] " " | " | 1.0818, 25.° | | |
| [20] " " | " | 1.827. 16.° | 69°.69. | |
| [21] Trichlorhydrin. | $C_3H_5Cl_3.$ | | 155.° | |
| [22] " | " | 1.40, 8.° | 155.° | |
| [23] " | " | 1.41, 0.° | 154°–157.° | |
| [24] " | " | 1.417, 15.° | 154°–159.° | |
| [25] Dichloracetone chloride | $C_3H_4Cl_4.$ | 1.47, 13.° | 153.° | |
| [26] Trichloracetone " | $C_3H_3Cl_5.$ | | 194.° | |
| [27] Trichlortoluol. | $C_7H_5Cl_3.$ | 1.413, 9.° | 227°–228.° | |
| [28] From crotonic aldehyde. | $C_4H_6Cl_2.$ | 1.131. | 125°–127.° | |
| [29] Monochloracetone. | $C_3H_5ClO.$ | 1.17. | 118°–120.° | |
| [30] Monoxethyl chlorhydrin | $C_5H_{11}ClO_2.$ | 1.117, 11.° | 183°–185.° | |

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[27] L. Henry. 22. 508.
[28] Kekulé. 22. 507.
[29] L. Henry. B. S. C. 19. 219.
[30] L. Henry. B. S. C. 18. 232.

| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Dichlorethoxylethylene. | $C_4 H_6 Cl_2 O.$ | 1.08, 10° | 128°2. | |
| [2] | Tetrachlorethyl oxide. | $C_4 H_2 Cl_8 O.$ | | 189°7. | |
| [3] | From tetrachlorethyl oxide. | $C_4 H_5 Cl_3 O.$ | 1.5725, 0.° | 154°8. | |
| [4] | " " " | " | 1.2354, 99°9. | | |
| [5] | Trichloracetal. | $C_6 H_{11} Cl_3 O_2.$ | 1.2813, 0.° | | |
| [6] | " | " | 1.2655, 22°2. | 204°8. | |
| [7] | " | " | 1.1617, 99°96. | | |
| [8] | Chlorovaleral. | $C_5 H_9 Cl O.$ | 1.108, 14.° | 134°–135.° | |
| [9] | Derivative of valeral. | $C_{10} H_{12} Cl_6 O.$ | 1.397, 14.° | 203 –204.° | |
| [10] | " " " | $C_{10} H_{10} Cl_4 O.$ | 1.272, 14.° | 208°–210.° | |
| [11] | Acetylchloral alcoholate | $C_6 H_9 Cl_3 O_3.$ | 1.327, 11.° | 198.° | |
| [12] | Trichlorphenomalic acid | $C_6 H_7 Cl_3 O_5.$ | 1.5. | | |
| [13] | Metachlorsalicylic aldehyde. | $C_7 H_5 Cl O.$ | 1.29, 8.° | 210°–220.° | |
| [14] | Ethyl glycolic chloride. | $C_4 H_7 Cl O_2.$ | 1.145, 1.° | 127 –128.° | |
| [15] | Methyl chlorocrotonate. | $C_5 H_7 Cl O_2.$ | 1.143, 15.° | 142.° | |
| [16] | Ethyl " | $C_6 H_9 Cl O_2.$ | 1.113, 15.° | 161°4° | |
| [17] | Propylenic chloronitrine | $C_3 H_6 Cl N O_3.$ | 1.28, 12.° | 157°–158.° | |
| [18] | Chloronitric glycol. | $C_2 H_4 Cl N O_3.$ | 1.378, 21,° | 149°–150.° | |
| [19] | Ethyl bromide. | $C_2 H_5 Br.$ | 1.4189, 15.° | | |
| [20] | Butyl " Normal. | $C_4 H_9 Br.$ | 1.2990, 20.° | 99°88. | |
| [21] | " " Iso. | " | 1.2038, 16.° | 92°33. | |
| [22] | Amyl " | $C_5 H_{11} Br.$ | 1.2059. 15°7. | | |
| [23] | Butylene " Iso. | $C_4 H_8 Br_2.$ | 1.809, 17.° | 149°7. (Two Samples.) | |
| [24] | " " " | " | 1.798, 14.° | 148°–149.° | |
| [25] | Hexylene " | $C_6 H_{12} Br_2.$ | 1.5967, 20.° | 205.° | |
| [26] | " " | " | 1.5975, 18.° | | |
| [27] | Heptylene " | $C_7 H_{14}. Br_2.$ | 1.5146, 18°5. | | |
| [28] | Isovinyl " | $C_2 H_3. Br.$ | 2.075. | | |
| [29] | Bromo toluol. | $C_7 H_7 Br.$ | 1.401, 18.° | 182°–183.° | |

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| | Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|---|
| [1] | Monobromhydric glycol. | $C_2 H_5 Br O.$ | 1.66, 8.° | 147.° | |
| [2] | Bromonitric " | $C_2 H_4 N Br O_3.$ | 1.735, 8.° | 164°–165.° | |
| [3] | Bromo. allyl nitrate. | $C_3 H_4 N Br O_3.$ | 1.5, 13.° | 140°–150.° | |
| [4] | " " acetate. | $C_5 H_7 Br O_2.$ | 1.57, 12.° | 163°–164.° | |
| [5] | " " alcohol. | $C_3 H_5 Br O.$ | 1.6, 15.° | 155.° | |
| [6] | " methyl allyl oxide. | $C_4 H_7 Br O.$ | 1.35, 10.° | 115°–116.° | |
| [7] | Bromo. allyl chloride. | $C_3 H_4 Br Cl.$ | 1.63, 11.° | 120.° | |
| [8] | Derivative of chloral. | $C_2 H Cl_3 Br.$ | 2.317, 0.° | | |
| [9] | " " " | " | 2.295, 19°5. | a. 200.° | |
| [10] | " " " | " | 2.129, 100.° | | |
| [11] | Butyl iodide. Normal. | $C_4 H_9. I.$ | 1.5804, 18.° | 129.82. | |
| [12] | " " Iso. | " | 1.592, 22.° | | |
| [13] | " " " | " | 1.6433, 0.° | | |
| [14] | " " " | " | 1.6278, 10.° | 117°5–118.° | |
| [15] | " " " | " | 1.6114, 20.° | | |
| [16] | Hexyl " | $C_6 H_{13}. I.$ | 1.4526, 0.° | 167.° | |
| [17] | Heptyl " Pseudo. | $C_7 H_{15}. I.$ | 1.20, 20.° | a. 180.° | |
| [18] | Propyl sulphide. | $(C_3 H_7)_2. S.$ | .814, 17.° | 130°–135.° | |
| [19] | Ethyl trisulphocarbonate. | $C_5 H_{10} S_3.$ | 1.152. | 240.° | |
| [20] | " disulphocarbonate | $C_5 H_{10} S_2 O.$ | 1.085, 19.° | 196.° Two isomers. | |
| [21] | " " | " | 1.085, 19.° | 200.° | |
| [22] | " monosulphocarbonate. | $C_5 H_{10} S O_2.$ | 1.0285, 18.° | 150°–156.° Two isomers. | |
| [23] | " " | " | 1.031, 19.° | | |
| [24] | Chloral sulphohydrate. | | | 123.° | 77.° |
| [25] | Ethyl butylxanthate. | $C_7 H_{14} S_2 O.$ | 1.003, 17.° | 227°–228.° | |
| [26] | Butyl " | $C_9 H_{18} S_2 O.$ | 1.009, 12.° | 247°–250.° | |
| [27] | Amyl " | $C_{10} H_{20} S_2 O.$ | | 265°–270.° p. d. | |

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[27] Mylius. B. S. C. 19. 221.

| Name. | Formula. | Specific Gravity. | Boiling Point. | Melting Point. |
|---|---|---|---|---|
| [1] Sulphophosphorous ether. | $C_6 H_{15} P S_3$. | 1.24, 12.° | 240°–280.° | |
| [2] Ethyl sulphophosphoric chloride. | $C_2 H_5 P S Cl_2$. | 1.30, 12.° | 175.° | |
| [3] " pyrosulphophosphate. | $C_8 H_{20} P_2 S_3 O_4$. | 1.1892, 17.° | | |
| [4] Triethoxylpyrophosphorsulphobromide | $C_6 H_{15} P_2 S_3 Br O_3$ | 1.3567, 19.° | | |
| [5] Ethyl silicate. | $C_8 H_{20} Si O_4$. | .9330 22°5. | | |
| [6] Silicon triethyl hydride. | $C_6 H_{15} Si H$. | .7510, 0.° | 107.° | |
| [7] " " chloride. | $C_6 H_{15} Si Cl$. | .9249, 0.° | 143°5. | |
| [8] " " oxide. | $(C_6 H_{15} Si)_2 O$. | .8590, 0.° | 231.° | |
| [9] " " hydrate. | $C_6 H_{15} Si. H O$. | .8709, 0.° | 154.° | |
| [10] " " acetate. | $C_8 H_{18} Si O_2$. | .9039, 0.° | 168.° | |
| [11] _____ | $C_8 H_{20} Si O_2$. | .8752, 0.° | 155°8. | |
| [12] _____ | $C_8 H_{20} Si O$. | .8403, 0.° | 153.° | |
| [13] Methyl orthosilicopropionate. | $C_5 H_{14} Si O_3$. | .9747, 0.° | | |
| [14] _____ | $C_{16} H_{40} Si_4 O_{12}$. | 1.071, 0.° | | |
| [15] _____ | " | 1.054, 14°5. | | |
| [16] Mercury propyl. | $(C_3 H_7)_2 Hg$. | 2.124, 16.° | 189°–191.° | |
| [17] Stann-tripropyl iodide. | $(C_3 H_7)_3 Sn. I$. | 1.692, 16.° | 269°–270.° | |

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# ALPHABETICAL INDEX TO SUBSTANCES.

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## H.

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## K.



## L.



## M.

## N.

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## Y.



## Z.



THE END.